Solid solutions

Trends in concrete building products continue to emphasize sustainability, innovation, and efficiency.

By Pamela Accetta Smith

Produced at a rate of about 25 billion tons per year and growing, concrete requires a tremendous amount of energy to produce, transport, build, and maintain, and it contributes to the world's carbon-dioxide emissions. But, according to the U.S. Green Concrete Council, it also provides significant benefits. And while organizations and experts help to weigh and balance the issues to aid designers in making more efficient use of the material, significant contributions to the achievement of sustainable development are being realized.

Market dynamics

There are several factors that continue to stimulate the market for concrete building products. According to Daryl S. Wenger, sales and marketing manager for Nitterhouse Concrete Structures, Inc., such factors include sustainability, energy efficiency, shortening the duration of onsite construction, and superior fire ratings. "These dynamics contribute to building more environmentally friendly structures — construction that would not negatively affect the environment, and products that can be recycled or save energy and natural resources," said Wenger.

Another overriding factor influencing the building products market remains the persistent effect of an economy in tentative recovery where the still-shrinking space for business opportunities is motivating the embrace of ideas that can give a company any edge, said Mike Carroll, executive vice president for McTech Group, Inc.

"The major trend for this climate will continue to be reliance on survival strategies," said Carroll. "The most promising among these are cooperative alliances between companies where resources and products are pooled to improve competitive advantage."

While it is true that wider knowledge of the superior sustainability of concrete structures and components has improved and will continue to improve into the next cycle, most companies are still focused on operating in survival mode, said Carroll.

"This not only means accepting low- or no-margin opportunities, but also necessitates that shortcut opportunities are less likely to go unfulfilled," said Carroll.

It has long been known and publicized that maximum concrete surface durability is achieved by proper wet curing," said Carroll. "However, despite this knowledge, recently some have chosen to shortcut this well-known fact in favor of other methods that produce less surface durability, require more densifier to achieve reflectance, and are consequently less sustainable."

Also rousing the market for concrete building solutions is the economic stimulus package of 2009, said Lou Valenzuela, Type K product sales manager for CTS Cement Manufacturing Corp. "These stimulus funds are being made available for the development, repair, and upgrade of infrastructure projects, such as wastewater treatment plants, which rely on concrete as a primary building material," said Valenzuela. "As such, CTS Cement is seeing an increased interest and need for its shrinkage-compensating concrete products, including Komponent and Type-K cement, all of which are marketed under the KSC brand."

Valenzuela said shrinkage-compensating concrete offers a real added-value alternative to the lifecycle of the design for wastewater treatment plants because it minimizes or drastically reduces the drying shrinkage associated with portland cement concrete and therefore significantly eliminates shrinkage cracks. "As a result, water-treatment containment vessels experience less leakage and possible environmental contamination," said Valenzuela. "KSC also provides benefits for other concrete structures that suffer from drying shrinkage, such as parking structures and industrial floors."

Sustainable effect

The sustainable design movement has had a positive impact on Nitterhouse's business in the multi-housing market, said Wenger. "With the use of locally sourced raw materials and the availability of fly ash and other admixtures used in our concrete mixes, we can reduce cement content, offering thermal mass systems," Wenger said.

Emerging trends and innovations in concrete

- Adding **optical fibers** to a concrete mix generates translucent concrete. This "see-through" development is changing the perception of concrete's opaque mass.
- **Reactive powder concrete** is extremely workable and durable and yields ultra-high strengths without using coarse aggregates. Reaching compressive strengths of 30,000 pounds per square inch, this new-age concrete also has tensile strength with the inclusion of steel and synthetic fibers.
- **Self consolidating concrete** (SCC) eliminates the need for mechanical consolidation and yields a smooth surface finish without mix segregation.
- White cement is the key ingredient in **decorative concrete**. New coloring agents and admixtures help create beautiful structures and landscapes.

Source: Portland Cement Association

Sustainability and the green building movement are stimulating the market for concrete structures, said Carroll. "These emerging factors seem to be gathering strength and will likely continue into the next recovery cycle."

Carroll said McTech has embraced the sustainable development movement by focusing its offerings on products that fit well into those methodologies. "To further our commitment, we have also developed products that fit into the qualifications of [U.S. Environmental Protection Agency Energy Star]," Carroll said.

As a company, Valenzuela said CTS has always strived to maximize its use of recycled materials and minimize its environmental impact with its products. "In that sense, our products have always been green," said Valenzuela. "Since our products have so many other advantageous features and benefits, we have been primarily educating people on these characteristics of our products. But, as people become more aware and concerned about the impact that products have on the environment, it is important that we educate people on the environmental benefits of our offerings as well."

KSC is a greener hydraulic cement technology because it has a much smaller carbon footprint than portland cement, said Valenzuela. "KSC has been specified for LEED-certified projects. In particular, the green benefits of KSC have been advantageous for large industrial floor slabs," said Valenzuela. "Large distribution centers have utilized shrinkage-compensating concrete because it provides a lower lifecycle cost for the concrete slab in terms of reduced maintenance over the slab's lifespan. Plus, the product itself is green in terms of its manufacturing process."

Answering the call

To meet market demands, Wenger said Nitterhouse conducts continuous research and development with different mix designs, using local materials, fly ash and other admixtures, alternate aggregates, and cements.

On the flipside, cooperative alliances such as the one between McTech and Universal Forest Products (UFP), where resources and products have been pooled to improve the company's competitive advantage, are also making a significant impact on the market. UFP, now McTech's exclusive U.S. distributor of the company's full line of concrete curing and load transfer products, has responded to the concrete buildings market by adding a Concrete Forming Products sales team, said Carroll. "Product offerings include FSC lumber, a full line of engineered wood products, and the McTech line of concrete accessory products," said Carroll. "Additionally, UFP and their partner companies are involved in the American Concrete Institute, American Society of Concrete Contractors, and state departments of transportation in developing better specifications to support a more sustainable future."

Valenzuela said CTS continually optimizes and refines its products as technology progresses. For example, in refining the company's Komponent additive that is blended with portland cement to create shrinkage-compensating Type-K cement concrete, CTS is increasing performance to allow the same degree of expansion with lower additive dosages.

"In terms of research, we have key partnerships with research universities such as the University of California Los Angeles and Oklahoma University," said Valenzuela. "Currently, we have partnered with the University of Alabama to instrument and monitor an advanced post-tensioned parking structure design that utilizes shrinkage compensating concrete to allow concrete spans which virtually eliminate structural shortening."▼

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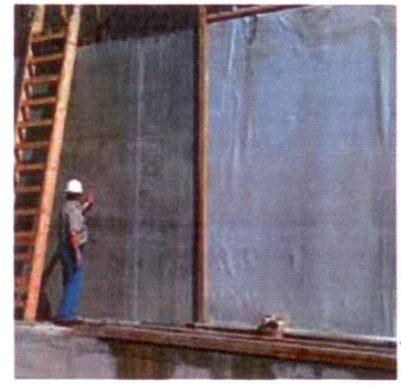
Nitterhouse Concrete Products Inc.

The strength of the precast/prestressed concrete floors and walls on the Kent Avenue housing project enabled the builder to install 462, 61,000-pound rooftop solar panels, supplying service for 101 units.



McTech Group Inc.

UltraCureDOT wet curing blankets provide proper hydrating and curing for both flat applications such as bridges and highways as well as vertical applications such as water treatment facilities.

CTS Cement Manufacturing Corp.

Parking structure decks at John Wayne Airport in Orange County, Calif., are still pristine and require virtually no maintenance 12 years after construction because of the shrinkage-compensating concrete mix used.