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*ConcreteWorks* is a publication of the **Alabama Concrete Industries Association** and features articles and photographs pertaining to product applications, educational opportunities, as well as innovative construction techniques impacting the industry. For reprints, visit [concreteworksonline.com](http://concreteworksonline.com)

Please email [kward@alconcrete.org](mailto:kward@alconcrete.org) with any comments regarding featured articles in *ConcreteWorks* or to suggest a story idea or a future edition. Our next edition will include residential concrete projects.

**Keri Ward**, Art Director & Editor • **John Sorrell**, Editor • **Butch Wyatt**, Editor

# CONCRETE

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## A FIRST CHOICE

For years, concrete was considered ... well, basic. Concrete always came to mind as a necessity in most building projects, but when the general public thought of it, it was as a foundation. Concrete was gray, it was industrial, it served a purpose. It didn't have to be pretty. Times have changed.

Today, concrete is fast becoming the number one choice in commercial and residential building projects for adding beauty while saving on cost. Concrete can be stamped to simulate the natural look of materials such as slate, stone, granite, brick or even wood, with incredible realism. It can be stained or etched with chemical process to add color and texture, and color can be added during the mixing process along an extensive palette or even customized. The possibilities are endless. Best of all, decorative concrete can be installed at a fraction of the cost of natural materials, while requiring much less maintenance.

Donnie Bush, owner of First Choice Equipment Rental in Andalusia, Ala., recognized concrete's versatility when he chose to incorporate both stained and stamped concrete for his new 6,000-square-foot facility.

First Choice rents, sells and services small construction equipment, including floor saws and concrete mixers and other concrete equipment. It also sells, rents, and services the Kubota tractor line.

"I knew if I built, I wanted concrete," he said. "And I have a brother-in-law in the floor covering business, so I'm sorry!" he said with a chuckle. "I looked at the price, and really you've got to pour the concrete. It was no more per square foot to have it colored and

stamped. Why pay more to put something on top of the concrete? If the concrete is done right, you don't want to cover it up."

Bush chose a terra cotta color stained concrete with a smoother surface for his building's interior, which houses a showroom, service area and offices. For the exterior he chose stamped concrete that mimics slate.

Stained concrete utilizes a chemical base stain, which is actually an acid base that etches the concrete. The texturizing element of the etching picks up a lot of characteristics, like swirls and patterns, adding definition and variety to the final finish in addition to the color, and stains react directly with the concrete's minerals to produce uneven, mottled and variegated color effects. Stain also can be used to create precise designs, including straight-line patterns and custom patterns, with a flat finish. Contractors can even add logos and other specialized designs to the flooring during installation.

In addition to new pours, existing concrete also can be stained using the decorative process, but there will be some variations in the result depending on the elements the area has been exposed to, whether indoors or out, which owners should take into consideration.

The stamped concrete process involves integrating color into the concrete during the mixing, then using another color that's a powdered release agent on the concrete after it is poured. The installer then uses a series of patterns that are pressed into the concrete to achieve the desired texture that works in combination with the color to create the finished look.





There's a wide range of patterns available for concrete stamping, providing nearly endless choices ranging from natural stone to brick or even the appearance of hardwood flooring. Stamping provides a much more impressive look than plain concrete, but retains the durability and convenience of concrete, often at a cost savings when compared to pricing the true natural materials. It takes a skilled eye to tell the difference.

**“...you would not think you are looking at concrete. It looks like authentic stone or brick”**

Mike Lanier, president of Evergreen Concrete in Evergreen, Ala., has seen a steady increase in customer requests for decorative concrete since it first came on the scene about 10 years ago.

“When you walk up to a stamped area, you would not think you are looking at concrete. It looks like authentic stone or brick,” Lanier says.

The First Choice project is one of the largest stamped concrete areas Evergreen has done to date, and it's very eye-catching, Bush says.

“Everybody comments on it – they love it,” he says. “We're right beside O'Reilly Auto Parts and you wouldn't believe the amount of people who come over just to look at it. It really looks just like laid slate.”

The new First Choice Equipment Rental facility opened June 14, and Bush is excited about the future of the company. He has been in the business for nearly 33 years, affiliated with Ben Williams Equipment Company and Nations Rent before going into business for himself in 2001.

“It's great to see this attracting attention to our building, and it just really goes hand in hand with the equipment that I can provide,” Bush says. “The variance of the look works really well, and to me it's the only way to go. Especially in a business like mine, where you're promoting concrete products – you need to promote concrete. This is the perfect way to do that.”

With its versatility, durability and beauty, decorative concrete continues to gain popularity in both commercial and residential projects. Concrete designs may be the hottest new thing for patios, flooring, entryways, pool decks and even countertops, but this is no flash in the pan. By nature, concrete is around for the long haul, and today's homeowners, builders and, increasingly, designers, see the value in using concrete in their long-range plans.

■ by Wendi Lewis



# SUSTAINABLE for Coastal Weather



When he got the call to develop a major new shopping center project in Orange Beach, AL, Jerry Ingle, project manager for Halstead Construction, felt it was obvious that something special needed to happen. The 33-acre, 260,000-square-foot Palm Point Shopping Center is located at the high-traffic intersection of Canal Road and Beach Road.

“This is the main intersection in Orange Beach, and the center needed to make a statement. It’s the best piece of land that’s left in the world as far as shopping center development, so we knew when we got it that we had to do something different,” Ingle

said. “This is some place everyone coming into and out of Orange Beach is going to see, and we needed it to draw.”

In addition to being eye-catching and attractive, the new center would have to be durable. The building needed to be able to meet the stringent IBC (International Building Codes) regulation of withstanding 140-mile-an-hour wind loads, a standard that came out of Miami Beach and has crept northward all along the Gulf Coast in the wake of recent hurricanes that devastated both commercial and residential structures.



As if this wasn't enough, the project includes seven acres of reserved wetlands, and would need to meet a variety of environmental standards.

Where to find materials for so many needs? Yan Cowart, of Infinity Architecture turned to concrete block, selecting products including tough gray masonry, varied and beautiful architectural masonry, and ecologically friendly erosion control products like pervious/permeable pavers and retaining walls. "Concrete masonry provided us with an aesthetically pleasing material that also allowed us to meet the strict code requirements on the gulf coast," said Cowart.

Concrete masonry units add up to time and cost savings that benefit designers and their clients today. They also stand the test of time, easily taking the abuse of severe weather, heavy traffic and vandalism, and resisting fire and mold. Its thermal mass also yields lower utility bills for the structure, which is especially important in today's economy.

"We build on the theory that the center needs to have a 40-year lifespan," Ingle says. "But we also tried to build a center of almost zero maintenance. No paint—all products have a natural finish that will fade a bit, but will not have the upkeep of painting. That's why we used the masonry block and that sort of product.



When you own and maintain a center for 20 years and more, you don't want to spend all your money on maintenance." Cowart added, "Concrete masonry performs well in the beach and salt water environment."

To make the project visually striking while maintaining the desired low-maintenance qualities, Cowart chose architectural concrete masonry.

Architectural concrete masonry units typically are made from natural and manufactured aggregates, sand, limestone, gravel, cement and natural and synthetic coloring pigments. These are primarily products of nature varying in size, shape, texture and particle color. Although quality color consistency is a manufacturer's goal, some variations in color, texture and uniformity may be anticipated in the final product.

The finished appearance of a concrete masonry wall can be varied with the unit size and shape, color of units and mortar, bond pattern and surface finish of the units. The term "architectural concrete masonry units" typically is used to describe units displaying any one of several surface finishes that affects the texture of the unit, allowing the structural wall and finished surface to be installed in a single cost-savings step.

Architectural concrete masonry is a made up of various face designs known to the industry as split-face block, split-scored, fluted or ribbed and ground face masonry units. These units are manufactured under controlled conditions in a variety of colors and combinations. The economics of the products and the low labor factor makes it easy to achieve a pleasant aesthetic design for clients.

The units can be used in a combination of single color or a number of colors on the exterior and interior of buildings. Also, architectural concrete masonry is the only masonry product that can be manufactured with an integral water repellent system for a lifetime of moisture protection.

Architectural masonry concrete blocks can be manufactured in many colors, shapes, sizes and finishes to inspire endless design possibilities, and can even be made to mimic brick and natural stone. Contrasting colors and textures, coupled with interesting design elements and previously unattainable visual details, can now come together to create a facility with real personality.

The Palm Point center uses mixed split face block with stucco, stone veneer and stone caps. The center is not a shopping mall, but rather a "point of delivery shopping center," where customers will drive up to the point of entry for the shop they want to visit. Using architectural elements like towers to accent the multiple buildings and diversity of colors helps provide each rental tenant a unique spot within the building.

"These materials were all architecturally selected, and the architects spent a huge amount of time on color design. We've got more colors in use than I've ever seen on a single project before," Ingle said. "White split face columns, earth tone split face walls, split face block and stone—all these colors were conceived and then we started trying to find product to fit the color."

Two of the retail buildings have four-side exposure, meaning that all four sides are visible. This allowed the architects to do more colors in those areas, featuring multiple earth tones.

"In the whole center, we can mix and match colors better than with pre-finished block or paint," Ingle says.

In addition to the main structures, which will house a Publix grocery store, CVS pharmacy and the retail center, the project features 48,000 square yards of paving. As a combination of City building code, architectural design choices and environmental considerations, Ingle chose permeable/pervious pavers for this project. In Orange Beach, City code dictates that 25-35 percent of a paved area has to be pervious.

Permeable pavers are a paving alternative to more traditional types of hardscape flooring materials, like asphalt. This product allows water to filtrate through the surface to the underlying soils. Traditional pavers do not allow much water to infiltrate, particularly if they are mortared in place. Water would normally hit the surface and then flow down to the nearest drainage channel, and become stormwater



runoff. Permeable pavers permit rain water to be absorbed by the ground underneath, while still managing to provide a stable enough surface for vehicles.

There are voids when the contractor lays the pavers in the field due to the nature of the product, one inch square every four inches, provides a 12 percent opening that allows storm water to infiltrate and seep into the grade rather than running off into a pond or ditches. Using pavers also yields more usable space for the developer, because it can reduce size of retention ponds. That is important especially in the coastal market, where the price of real estate is high, and an owner does not want to devote expensive property to retention ponds.

Permeable pavers also make sense on this particular project because the location of the land on which the center stands requires that

storm water runoff be contained to the property. Halstead designed a perforated drainage pipe, so the water seeps down from the pavers into the perforated pipe and eventually dissipates into the sand.

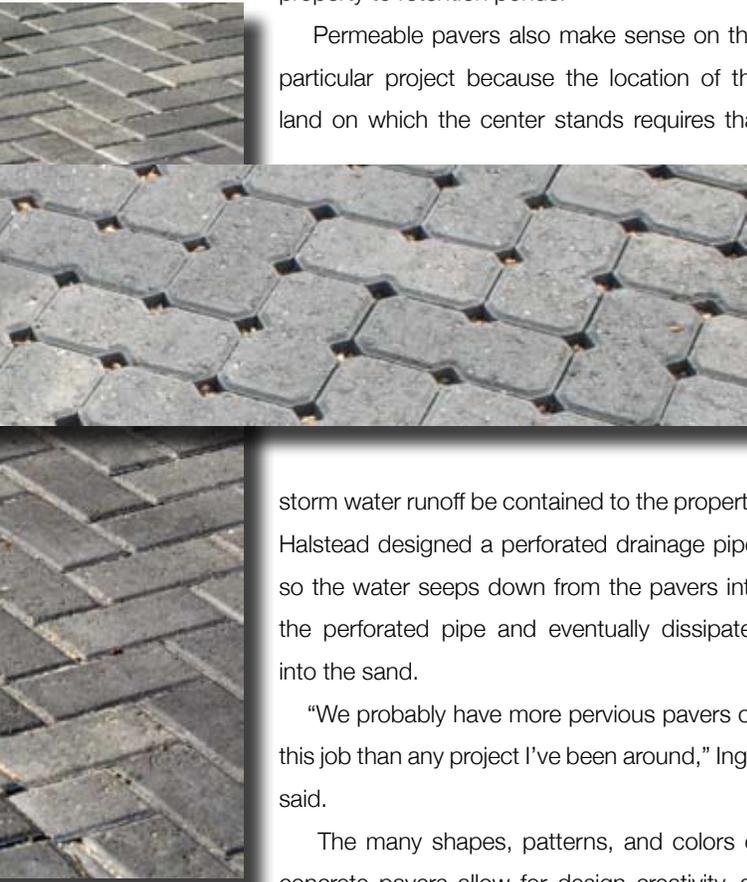
“We probably have more pervious pavers on this job than any project I’ve been around,” Ingle said.

The many shapes, patterns, and colors of concrete pavers allow for design creativity, as well as delineation of pavement areas, such as parking lanes, cross walks and intersections. The beauty of pavers adds value and visual appeal to any property. By adding flexibility not possible with rigid pavement, pavers can flow with existing landscaping to deliver beauty to any property.

Concrete pavers also are extremely dense units that have exceptional strength and durability, superior stability under severe loads, and are unaffected by the extremes of heat and frost. A segmental paving system allows for expansion and contraction without producing surface cracks. The pavement system moves

in unison with the earth’s usual tendency to swell and contract over the long term, thus avoiding any serious damage. They can take more abuse and last for generations.

Concrete masonry is also used on the Palm Point property in the construction of the segmental retaining walls used for borders of stormwater retention ponds. Retention ponds are common requirements in most projects to handle overflow from rainwater not absorbed by the soil, even with pervious pavers. The use of the segmental retaining wall provides a clean look rather than just a sloped ditch or hole in the ground, and a neat border.



## Numbers Numbers Numbers Numbers Numbers...

- 33 acres of retail real estate
- 260,000 square feet of shopping center
- 7 acres of preserved wetlands
- 97,000 square feet of pavers
- 3,000 square feet of pedestrian walkways
- 10,000 segmented retaining wall units
- 10-14 ft. retaining walls
- More than 111,000 concrete masonry units used
- 4 different architectural set colored blocks

“Using pavers also yields **more usable space** for the developer, because it can reduce size of retention ponds.”



The Palm Point Center uses a tremendous amount of retaining walls, constructed in a modular style with brown pavers, for regular runoff as well as to border the three wetlands, which are edged with 10-14-foot retaining walls.

Halstead incorporated the wetlands as an attractive feature of the property, constructing patios around the main building to showcase the wetlands as an asset. They also constructed 3,000 feet of pedestrian walkways and bridges bordering Hwy 151 at the request of the City of Orange beach.

The Palm Point Shopping Center is on track to open this August. All buildings are up and most of the infrastructure is in place.

“This is really the king of shopping centers,” Ingle says. “It accomplishes everything I had hoped to do – it’s very attractive and the great variety of colors and textures really catches your eye. And, it’s durable – it accomplishes the 40-year goal, certainly. It’s a great project, all around, and one that people will enjoy for years to come.” ■ by Wendi Lewis



# Lower Costs Anchor Concrete Pavement

In the small town of Westover, AL, 12 miles from the outskirts of Birmingham, 36,000 square feet of concrete spreads evenly over the grounds of the newly opened Rambo Marine. Generously covered with boats on trailers and cars from customers, the parking lot is a ringing example of an up-and-coming trend in parking lot construction.

"It just made sense to use concrete," said Scott Berry of Virgil Berry Construction in Scottsboro. Berry served as the project

manager of Rambo Marine Westover location. "We had initially planned on using asphalt but it just made more sense to go with concrete."

When Berry quoted the price for asphalt, he was taken by surprise. "With petroleum prices absolutely skyrocketing lately, and asphalt being a petroleum-based product, it was more expensive to use asphalt over concrete," Berry said. The estimate for asphalt with striping for the Rambo Marine lot came to \$160,000. The





estimate for using concrete came to just \$100,000. Historically asphalt parking lots have been cheaper in respect to initial cost. However, with the rising price of petroleum, concrete is often less expensive on initial cost. Concrete still enjoys the benefit of having lower life cycle cost. Depending upon the initial design, an owner of an asphalt parking lot will have to reseal and re-stripe the parking lot every seven years. Concrete on the other hand, requires little to no maintenance during its service life.

As the construction team took a closer look at the project, the benefits of using concrete became more obvious. For example, concrete proved to be less time consuming. Essentially, 4000 psi concrete mix was poured over the entire area of the parking lot in three large, back-to-back pours. With asphalt, both light-duty and heavy-duty varieties would have been used in different areas depending on traffic and weight requirements. Cecil Lee, general manager for the Rambo Marine Westover location, also was concerned that the asphalt would sink where some boat trailers would sit stationary for months at a time. The uniform concrete pour throughout the lot would provide ample strength for customer's cars, boats on trailers and trucks bringing in new products.



Even if asphalt had been used, concrete still would have been needed for curbs, gutters and joints. Not only would this have increased construction time on the lot, it also would have cost the company an additional \$10,000 to \$15,000 in labor and material, Berry said.

Temperature is another important consideration for a business where customers have to actually walk on the parking lot in order to look at the merchandise. "Dark asphalt on a warm Alabama day can absorb the sun's heat and raise the surface temperature to more than 130 degrees" stated Colby Weitman, concrete salesman on the project. "Alternatively, concrete is lighter in color and able to reflect the sun's rays, making for a much cooler, inviting environment."

The cooler surface of concrete also results in cooler storm water runoff, which is more environmentally friendly and benefits area lakes and streams. Concrete lots don't absorb oil that drips from

cars, allowing the oil to pass through gutters and catch basins. Conversely, asphalt does absorb the oil, causing it to seep into the soil, then the bedrock and out into rivers, Weitman said.

The concrete parking lot also is more attractive than asphalt, Weitman added. "This is a highly respected business that wanted the quality of their parking lot to match the quality of their boats."

In the end, the low maintenance and durability of a concrete parking lot made it the most attractive choice for Lee. "It doesn't need annual resealing or repairs. It's just a great product," he said. Berry agreed: "Concrete has a very long life span. It just holds up better over time." ■ by Jennifer Walker



# A+ Logical Solution

## Concrete Moves to the Front of the Class

Trussville High School sits nearly a mile down a quiet road off Deerfoot Parkway near Birmingham, rising up through masses of tall oak trees and resting just feet from the rushing waters of the Cahaba River. Deer and wild turkey roam nearby, occasionally startled by the distant clanking and roaring of construction, which has run steady and constant here for the past several months.

Scheduled to open this fall, the 361,000-square-foot high school is a masterpiece, designed with architectural details like striking fluted walls, dramatic recessed masonry panels, and polished concrete floors. Ringing in at \$71 million, it is no surprise that this work of art is the largest bid school in the history of state.

"It is pricy. And it's big," admitted Courtney Quinlivan, principal architect with Davis Architects in Birmingham and manager of the Trussville High School project. However, this was no ordinary project. Trussville is one of Alabama's fastest growing communities, having jumped from only 3,500 residents in 1980 to just under 20,000 in 2005. Its appeal became more widespread when, in 2005, "CNN Money Magazine" ranked Trussville 56th in its listing of Best Places to Live.

Three years ago the city formed its own school system. The new Trussville High School will be the fifth school in the system and will serve as the only high school in the city, said Kelly Bowles, community relations coordinator for Trussville City Schools. Building a new high school, in many ways, represented the board's faith in the future of its city.



School board members' vision for the school was far reaching, stretching beyond current high school enrollment, which is at about 1,200. Too often schools have been built with little thought of where enrollment would be years later, said Bowles, resulting in the need for portable buildings. "We didn't want to get to that point," she added. Thus, the school board dreamed big. However, it did not want to sacrifice beauty and durability in the process.

With the board's wishes in mind, Quinlivan designed the school large enough to hold 1,600 students, and included a separate four-story wing that could be added later to make room for an additional 800 students. The plan also included an indoor gymnasium as well as a practice gymnasium, large theater with stadium seating, cafeteria with an outdoor porch and a large band room with individual practice rooms.

Five outdoor practice fields also were planned across the Cahaba River, connected to the school by a bridge.

Quinlivan wanted the school's design to be respectful of its environment, saving as many trees as possible around the building and even in the parking areas. But she also wanted it to be attractive and modern while complimenting the city's traditional style. "The board was interested in thinking long term, about what kind of legacy it could leave because this school needs to last a long time," Quinlivan said. So she looked to sustainable building materials that not only would be attractive, but also would hold up well over time and require little maintenance.

Concrete was a logical solution. "It's beautiful, low-maintenance and timeless," Quinlivan said. "And it's fast and easy."

Nearly 600,000 regular concrete measuring units are used in the school, as well as 400,000 jumbo brick. As many as 120 masonry craftsmen were needed to meet the stringent deadline. Their work with the project was substantially completed in February.

"It's beautiful, low-maintenance, and timeless...And it's fast and easy."

Creative use of stacked stone and split-face block added elegance to the exterior of the building. At the school's entrance, the masonry veneer was laid with a fluted pattern, offering definition and style to the exterior. Hallways were enhanced by recessed panels made from concrete blocks. And polished and stained concrete covered most floors.

Some concrete applications may have been more expensive than other materials on the front end, Quinlivan said. But because concrete requires so little upkeep, using it saves money in the long run. "It's so low maintenance," she said. "Concrete pays for itself in just a few years."

Barry Davis with Trussville Board of Education's support services for new construction says that the low maintenance issue made concrete an attractive choice. "That's why we went with the polished concrete floors," he said. "They require no stripping and waxing two times a year as with BCT tiles, and you don't have to replace them like with carpet." Creative use of concrete on the exterior also had low maintenance advantages. "No painting is needed. It takes a lot less maintenance than, say, using stucco," he said.

While the building was not designed to be LEED Certified, Davis said, every effort was made to respect and protect natural environment around which the school was built. "I think we've done an environmentally good job with the new building," Davis added. "It is still an environmentally sound building on a nice piece of property. And it will give years of enjoyment to our community."





Though the school is situated a bit off the beaten path, it will be connected by walking trails to the city's soon-to-be-open civic center. As Trussville continues to prosper, the school eventually will be in the new heart of town, Bowles said. "With the civic center opening soon, this area will be a new hub of activity."

■ by Jennifer Walker





# CLEAN



# Approach to Food Service

*Through the use of concrete floors and tilt up construction, Red Diamond was able to construct a state of the art facility to meet the regulations as well as will allow for seamless future growth.*



Currently under construction in Moody, AL, just northwest of Birmingham, is the new Red Diamond Inc. campus that will feature three expandable production facilities for coffee, tea and food products and services, as well as new corporate offices. The size of the project, which spans 65 acres, coupled with the company's desire for facilities that can be easily expanded, and the special nature of food service production, made concrete a perfect choice for the job. "Cast-in-place concrete columns were chosen for the corporate office as they allowed us to mimic the limestone look we hoping to achieve, and complimented the tilt up panels on the production facility and warehouse. The use of tilt up on panels on the production facility will allow the owner to expand in the future and keep a uniform appearance on the campus," stated Bill Williams of Williams-Blackstock Architects.

Concrete has historically been the material of choice in food service facilities because it provides a smooth and low maintenance surface that can hold up to vibrations from heavy machinery while being easy to clean, able to withstand high-heat and chemical sterilization processes and minimizing dust particles

or crevices that might harbor germs or dirt.

"Particularly, we wanted to make certain our packing rooms, which have pits dug in for equipment, were very dry and very stable in order to prevent moisture problems with our products, and we wanted to make sure our floor could be easily cleaned," said Bill Bowron, President & CEO of Red Diamond, Inc.

Above all, sanitation is the critical issue for flooring in modern food processing plants. A smooth finished concrete floor at the proper slope, featuring a sprayed or brushed-on sealer, is said to be best for normal environments.

"We've used a process finish that's being ground down and polished. It will be a beautiful floor," Bowron said. "The concrete was actually wet cured and it's super smooth. We knew concrete was the absolute best for something like this."

In addition to being smooth and sealed, the floor in the manufacturing facilities needed to be strong, able to hold large machinery and withstand daily vibrations from the manufacturing process. Project engineers chose concrete reinforced with steel fibers, the latest technological advancement, rather than pouring



the concrete around a wire mesh mat, which is the more traditional process for adding strength to the overall structure.

In this new process, steel fibers are put into the concrete mixture by the concrete producer at the plant and are distributed throughout the concrete during mixing, so instead of one layer of reinforcement, the project has top to bottom structural properties. Distribution of the steel throughout the entire slab lends to its strength overall. The steel fiber concrete is in use at the Red Diamond facility in the floors supporting the equipment and machinery, as well as in walls, columns and other key pressure points in the structure.

Industrial concrete floor slab systems are often required to perform under intense loading conditions, including point loads from rack legs and dynamic loading from vehicular traffic. The uniform distribution of steel fibers throughout the concrete mix transforms concrete into a more ductile composite material that increases the energy absorption capability of the slab. Additionally, it provides exceptional control of drying, shrinkage and cracking, and maximum load stability at the floor joints, where it is most needed.



“I am very happy with stability, durability and clean approach concrete has provided us”

Red Diamond’s current food service structure utilizes prefabricated steel with a metal skin, but the new facilities needed to be flexible enough to double in size without interrupting production. In order to accomplish this, the project utilizes tilt-wall construction.

Tilt up or tilt slab is a type of building and construction technique in which modular concrete elements, which may include walls, columns and structural supports, are formed on a concrete slab, usually on the job site. The concrete is formed on the building floor or a temporary concrete casting surface near the building footprint. After it has cured, the element or elements are tilted from horizontal to vertical and braced into position until the remaining building structural components are secured, and then they are bolted into place. By pouring the concrete in forms on the ground, project engineers can make sure they are consistent in texture, strength and finish, as well as cosmetically uniform. This ensures that each panel is identical, so that they tie together perfectly.

To expand an existing facility, new identical panels can be constructed using the same process as the original panels, and tied into the existing construction and expanded structural slab. The panels are put up or taken down in sections as need or desire arises, so that the facility can be expanded quickly and efficiently.

In addition to its many technical advantages, concrete was an attractive choice for this project to meet short and long term budget requirements. Red Diamond selected decorative stained concrete and textured concrete for its exterior, allowing it to incorporate low maintenance design elements. The insulating nature of concrete also helps the buildings to be energy efficient, reducing costs for heating and cooling the large facilities.

Project contractors have been working on several buildings on the Red Diamond campus simultaneously, to help in the transition from Red Diamond’s existing facilities to the new location. Construction has involved multiple pours occurring in different areas of the campus at the same time to help meet move-in goals. Red Diamond cannot stop production for the move, so it must be done in stages, which the busy construction schedule will allow.

Red Diamond will move its corporate offices into the new facility on the Moody campus in November, and is on track to move the coffee production into its new building this year as well, with the tea production set for January/February 2009. Preparation of the site for construction of the food distribution service center is complete and construction of that facility is under way. It is estimated that all of Red Diamond’s production, distribution, service and office



facilities will occupy the new corporate campus location by the middle of next year.

“I am very happy with stability, durability and clean approach concrete has provided us,” Bowron said. “We’ve really gotten everything we’ve asked for. We are a national company and this new facility will give us the ability to substantially grow, and we’re very excited about that. I couldn’t have asked for anything more.”

■ by Wendi Lewis



# Concrete Keeps ALABAMA RAILCAR on TRACK

*Concrete plays a pivotal role in the construction of a new railcar manufacturing plant in north Alabama.*



Last summer, National Industries, Incorporated., the parent company of National Steel Car Limited, announced they would build a 2.2-million-square-foot railcar manufacturing plant in north Alabama. The facility will be located on 640 acres in the Barton Riverfront Industrial Park about 15 miles west of Tusculumbia. The facility will be one of the largest railcar facilities in the world, capable of producing 10,000 to 12,000 cars per year when it becomes fully operational by the end of the year.

Concrete was a must for the building's infrastructure because it offers strength and durability that will withstand the projected heavy manufacturing process, said project manager Michael Hartel, PE, LEED® AP, with the Albert Kahn Family of Companies. The Detroit-based architecture, engineering, planning, design and management firm, was commissioned to serve as the project's architect/engineer.

Kahn employed process design and optimal plant configuration solutions to create a new single structure facility under one roof designed to provide a low-cost, flexible operation with enhanced product throughput. At nearly one mile in length, the plant will house the fabrication, construction, finishing and administration functions to support the company's manufacturing operations.

Because of the extreme weight of the railcars that would be manufactured, special provisions were made during the building's

design and construction phases. For example, as railcars exit the construction line they are supported on steel floor rails embedded in the concrete floor slab. Below these embedded rail locations is a continuous track mat or concrete foundation designed to support the weight of the railcar as it continues to the painting and final finishing operations, Hartel explained.

The slab on grade is reinforced to accommodate the heavy material handling equipment requirements for the manufacturing operations needed to be reinforced. Initially, rebar was considered for the reinforcement, however, "upon further design analysis, it was determined that using steel fibers in lieu of rebar would produce a more economical slab and help facilitate the floor slab installation," Hartel said. "By their very nature, steel fiber reinforced slabs have a greater resistance to impact, which is also a key attribute preferred for the heavy industrial nature of this manufacturing process."

Fiber-reinforced concrete offers a host of benefits including increased structural capacity, resistance to impact, resistance to cracking, decreased permeability and impact and abrasion resistance. The most common types of fiber reinforcement materials include steel or synthetic materials, such as polyester or acrylic. Steel fibers usually are about one to two inches long and are rough along the edges to help the concrete adhere to the fiber. Typically, the amount of fibers used in concrete mixtures ranges between 0.5





to 2.0 percent by volume, depending on the project.

For added strength to the building's exterior, Hartel chose Precast concrete panels or tilt up panels as they are most commonly known. Tilt up panels are many times chosen over more economical options, such as metal buildings, for their extreme durability and aesthetics, Hartel said.

The project placed the concrete panel casting beds on site, which saved time to help meet the fast track construction schedule. Concrete is placed and cured in the casting beds, the precast panels are lifted or "tilted" out of the forms and set in place. Tilt-wall construction also helped simplify steel erection by allowing for timely installation of the concrete panels reducing interference with the steel crews, Hartel said.

Not only can tilt-wall construction speed up a job's pace, it can also help minimize vandalism and maintenance inside and out, withstand high winds and weathering, and absorb sound for a quieter environment. Plus, they are naturally fire resistant, which can ensure safety and lower insurance premiums.

The demand for concrete was substantial, said Paul Panelli with Yates Construction, representing the project's construction management team of Yates-Walbridge. The project required more than 16,000 cubic yards of concrete for 1,150 concrete foundation pads and 130,000 concrete slabs.

In addition to steel fibers, large amounts of mid-range water

reducers were required on the job. The mid-range reducers were necessary to allow the concrete to be pumped more easily. Much of the concrete on the project has been pumped as it was often impractical or impossible to service the pour out of the back of the truck. All admixtures used in concrete construction, whether they are chemical or mineral, should meet the specific requirements of each job. Testing is required to evaluate how the admixture will affect the properties of the concrete for a specific job and the job's anticipated ambient conditions. The railcar manufacturing plant was no exception. Approval was needed during the development of the mixes to ensure they stayed within the required specs. Regular testing of the mixtures was conducted during the plant's construction phase by both the ready mix supplier and the contractor.

Overall, concrete not only helps keep the railcar manufacturing plant construction on its fast-paced schedule, it offers the strength and durability needed to keep it functional for many years to come. "It was a very complex project with very specific needs," Panelli said. "For much of the project, there was really no other choice but concrete." ■ by Jennifer Walker