Manufacturing Better Plants

— Wayne A. Endicott

Designers cite durability, low maintenance, speed of construction as key reasons they use precast concrete for warehouses and industrial buildings

Owners and designers of warehouses and industrial plants are finding that precast concrete components offer design techniques that appeal to them on many fronts. Despite the variety of applications for these structures, the material offers benefits that make it a key solution in achieving the owner's goals.

As with many projects, time is money for these buildings, as they are often used to manufacture or store products that generate revenue. Because precast concrete walls can be quickly fabricated and erected, they can substantially shorten construction time. Precast concrete also offers a wide array of exterior design options, allowing the structure to project a corporate image or blend with neighboring buildings.

The components can span long distances, providing large, unobstructed layout options, which are critical when moving materials or setting up efficient assembly or processing lines. The material's strength and durability also help ensure that the building won't be damaged by material-moving equipment, such as forklifts. The ability to use insulated precast concrete panels adds thermal advantages, keeping the plants cooler in summer and warmer in winter. And large openings for truck bays are easily accommodated in the exterior walls because of precast concrete's inherent strength.

Action Packaging Warehouse
M+H Architecture, St. Louis, Mo.

Anheuser-Busch Distribution Center
Michels & Waldron Associates, River Vale, N.J.

National Gypsum Co.
Merriman/Schmitt Architect, Charlotte, N.C.

'The economics make sense because of the durability and energy efficiency of the system.'

Middlesex Center
M+H Architecture, St. Louis, Mo.

Custom form liners created the iconic Anheuser-Busch bow tie logo in the precast concrete walls.

Fact Sheet

Project: *Anheuser-Busch Distribution Center*

Type: *Warehouse*

Location: *Hunts Point, Bronx, N.Y.*

Architect: *Michels & Waldron Associates, River Vale, N.J.*

Contractor: *Milric Construction, Neptune, N.J.*

Owner: *Milric Construction*

PCI-Certified Precaster: *Oldcastle Building Systems Division, Morrisville, Pa., and Edgewood, Md.*

Project Size: *167,000 ft²*

Precast Concrete Components: *95,000 ft² of insulated load-bearing wall panels with a nominal panel width of 10 ft*

Use of insulated wall panels contributed to achieving LEED points for the Anheuser-Busch Distribution Center. These included supplementary points under the Energy & Atmosphere category as well as points for diverting construction waste, using recycled materials, and using locally obtained materials.

Insulated precast concrete panels helped Anheuser-Busch achieve LEED certification.

Efficient Packaging Plant

Architect Ken Dixon of Dixon Architecture took advantage of those benefits when he designed, in collaboration with First Companies of Grand Rapids, Mich., a new 109,000 ft² facility for Action Packaging of Caledonia, Mich. The decision to specify precast concrete was made after consultation with the owner. "We presented them with a variety of options," including pre-engineered steel, precast concrete, and cast-in-place concrete," says Dixon. The final choice was a hybrid structure, with a pre-engineered steel roof and load-bearing precast concrete insulated wall panels for the exterior.

A driving force in the decision was Dean Rosendall of First Companies, which has set out to become an expert in the construction of precast concrete buildings. Says Butch Stoner of Action Packaging, "Precast has definitely proven to be a great choice. Seeing the ease and timeliness of the precast being installed was amazing."

The building's design includes 115 precast concrete panels with 2 in. of insulation sandwiched between two wythes of 3-in.-thick concrete, with some of the panels rising 27 ft high. Some of the exterior panels feature an exposed-aggregate finish, while others were stained on-site after erection. "The finished building has a nice, clean look and, from the long-term view, the economics make sense because of the durability and energy efficiency of the system," says Dixon. Kerkstra Precast of Grandville, Mich., supplied the precast concrete components.

Meeting Multiple Needs

Designers are also using precast concrete's adaptability to its best advantage, as can be seen in Middlesex Center, a large multitenant warehouse facility in Jamesburg, N.J. The 1,351,200 ft² building had to be designed to meet the needs of two tenants simultaneously. The project, part of a newly created warehouse district that includes three buildings, is owned by Industrial Developments International of Atlanta, Ga. The full-service, national industrial real-estate developer worked with Greenfield Builders Inc., who chose M+H Archi-

tecture of St. Louis, Mo., to design the first of the three buildings.

Mark Farmer, project manager for M+H Architecture, specified 10-in.-thick insulated precast concrete panels that are 12 ft wide and up to 46 ft tall for several reasons. "Cost, durability, and speed of construction all contributed to our decision to use precast concrete panels for the exterior of the building combined with steel columns and bar joists."

One of the strongest arguments for using precast concrete was that the panels could be cast in the Baltimore plant of the Building Systems Division of Oldcastle Precast Inc. while on-site work was completed. That work included erection of all structural steel, except the end bays. The erection of the approximately 490 precast panels encompassing 256,000 ft^2 was accomplished in just 30 days by the contractor, Greenfield Builders Inc. of Indianapolis, Ind.

Another factor in the decision to use precast concrete concerned the contractor's familiarity and experience with other such buildings. The building contains two identical 675,600 ft^2 bulk distribution centers, each with its own main entrance. The building's interior features 36 ft clear heights and 50 ft x 50 ft column spacing.

The exterior precast concrete walls feature a smooth finish with cast-in reveals. After erection, the walls were painted. They include 279 dock doors with a cross-dock format, or one door for each 4000 ft^2 of area.

Precast Aids LEED Certification

Anheuser-Busch's iconic corporate logo, the red "bow tie," is now prominently displayed on the wall of the brewer's new distribution center in Hunts Point, Bronx, N.Y. The logo was cast into the exterior finish of the precast concrete panels that make up the exterior walls of the controlled-environment warehouse. Integrated form liners created the logo during the casting process.

More importantly, insulated precast concrete panels met a variety of design challenges, including the goal of obtaining LEED certification, according to Arthur Michels, principal of Michels & Waldron Associates LLC, Architects & Planners, in River Vale, N.J.

"One of Anheuser-Busch's marketing points with its Budweiser beer is its 'use by' date," Michels explains. "So one of their strongest require-

Action Packaging in Caledonia, Mich., used precast concrete wall panels with 2 in. of insulation sandwiched between two 3-in.-thick wythes of concrete to speed construction while providing an energy-efficient design.

Fact Sheet

Project: *Action Packaging Warehouse*

Type: *Warehouse*

Location: *Caledonia, Mich.*

Architect: *Dixon Architecture, Grand Rapids, Mich.*

Contractor: *First Companies, Grand Rapids*

Owner: *Action Packaging, Caledonia*

Engineer: *Northern Structural, Caledonia*

PCI-Certified Precaster: *Kerkstra Precast Inc., Grandville, Mich.*

Project Size: *109,000 ft^2*

Precast Concrete Components: *115 insulated panels 12 ft wide and up to 27 ft high, totaling approximately 26,500 ft^2*

ments was that the distribution center be environmentally controlled to keep the beer at the proper temperature to ensure that the dates stamped on the label meet the requirements of that pledge. The insulated precast concrete panels allow the company to meet climate-control goals needed to keep the beer fresh until it ships."

The project was built under a design-build delivery agreement between Michels & Waldron and Milric Construction of Neptune, N.J., the contractor, construction manager, and owner. The building's design also achieved some important goals stressed by the design-build team. Not the least of these was the desire to obtain LEED certification, a goal strongly aided by the use of precast concrete wall panels, Michels says.

The insulated panels, cast by Oldcastle in its Morrisville, Pa., and Edgewood, Md., plants, created a thermal-mass effect that helped obtain points under the Energy & Atmosphere category of LEED. The precast concrete also helped meet requirements for points in the Material & Resources category in several ways. The panels feature recycled and locally obtained materials and do not contribute to on-site construction waste, since they arrive ready for erecting. Other benefits helped obtain points in credit categories such as Sustainable Sites, Indoor Environmental Quality, and Innovation in Design. (For more on using precast concrete panels to achieve LEED certification, see the related article on page 26.)

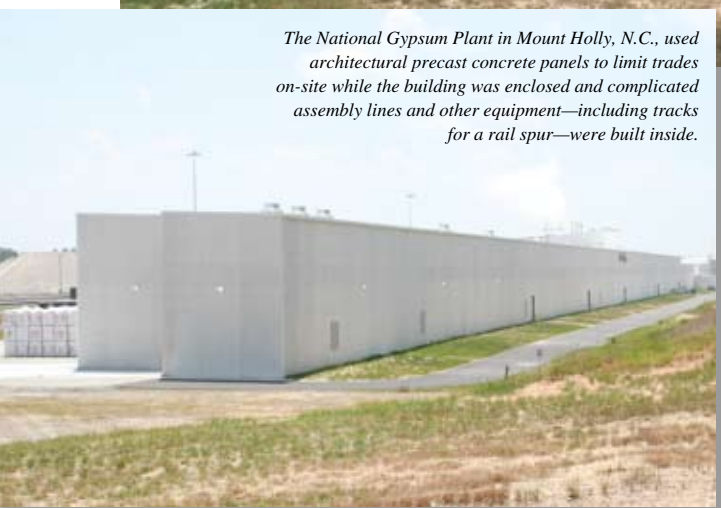
In all, 95,000 ft^2 of insulated 10-ft-wide, load-bearing panels enclosed the building. Among the advantages of using the panels cited by Michels is their durability, an ongoing issue in any warehouse facility where material-handling equipment is in use. Also, once the panels were sealed, they reduced the dust level and kept the interior cleaner.

Keeping It Simple

One reason precast concrete panels are frequently used on these buildings is that they simplify on-site construction issues. That's the view of Steven Schmitt, president of Merriman/Schmitt Architects Inc. in Charlotte, N.C., the architectural firm for the new National Gypsum Plant, a 2330 ft by 545 ft manufacturing plant in

'It was desirable to limit the number of trades on the site at one time.'

The National Gypsum Plant in Mount Holly, N.C., used architectural precast concrete panels to limit trades on-site while the building was enclosed and complicated assembly lines and other equipment—including tracks for a rail spur—were built inside.



The precast concrete panels on the National Gypsum Plant feature exposed aggregate that was sand-blasted in the field and left unpainted. The smooth panels don't allow dust to collect, a key concern for manufacturing plants.

Fact Sheet

Project: *National Gypsum Co.*

Type: *Manufacturing plant, offices, and warehouse*

Location: *Mount Holly, N.C.*

Architect: *Merriman/Schmitt Architects Inc., Charlotte, N.C.*

Contractor: *Bovis Lend Lease, Charlotte*

Owner: *National Gypsum Co., Charlotte*

PCI-Certified Precaster: *Tindall Corporation, Spartanburg, S.C.*

Project Size: *2330 ft long by 545 ft wide*

Precast Concrete Components: *225,000 ft^2 of insulated precast concrete panels up to 44 ft high; exposed-aggregate finish sand-blasted in the field*

Fact Sheet

Project: *Middlesex Center*

Type: *Warehouse*

Location: *Jamesburg, N.J.*

Architect: *M+H Architecture, St. Louis, Mo.*

Contractor: *Greenfield Builders Inc., Indianapolis, Ind.*

Owner: *Industrial Developments International (IDI), Atlanta, Ga.*

PCI-Certified Precaster: *Building Systems Division of Oldcastle Precast Inc., Baltimore, Md.*

Project Size: *1,351,200 ft²*

Precast Concrete Components: *Insulated precast concrete wall panels 12 ft wide by 10 in. thick by 46 ft tall, totaling 255,500 ft² with a smooth form exterior finish painted in the field*

This 1.35 million ft² warehouse facility in Jamesburg, N.J., was designed to be occupied by two tenants. Precast concrete wall panels clad the building because they offered cost, durability, and speed benefits. Erection of the panels took only 30 days.

The precast concrete walls were finished with reveals cast into the panels, and they were painted on-site after erection.

'Cost, durability, and speed of construction all contributed to our decision to use precast concrete panels.'

Mount Holly, N.C.

"Because of the manufacturing equipment that needed to be installed inside the building virtually at the same time as construction was proceeding, it was desirable to limit the number of trades on the site at one time," he explains. Because the exposed architectural concrete monolithic panels arrived on site from Tindall Corp.'s nearby Spartanburg, S.C., plant ready to be placed, they could be installed as they arrived. Meanwhile, work on other trades proceeded under the direction of the general contractor, Bovis Lend Lease of Charlotte, N.C., on the interior of the building.

This was critical for the National Gypsum Plant, which contains a complicated mixture of functions, including a rail spur that runs through the building. Also part of the project were a warehouse, a conveyor system, offices, a parts area, a manufacturing line, and even a domed structure containing raw materials used in the manufacturing process.

The panels that make up the exterior walls are 12 ft 6 in. wide and up to 44 ft tall. The exposed-aggregate panels were sand-blasted in the field and left unpainted. Their use provides another advantage: because they contain no ledges, they do not promote the collection of dust, a major concern in a plant of this nature, Schmitt says.

More to Come

The architects for all four projects advocate the use of precast concrete panels, agreeing that they will continue to recommend the system to their industrial clients. Dixon's firm is already designing a plant in New Brennan, Mich., that will feature the panels. Michels paints himself as "an enthusiastic precast advocate." Farmer notes that he is involved with the design of three or four projects that feature precast concrete wall panels. Schmitt says he will continue to recommend precast concrete components as he discusses designs with his industrial clients.

"For durability, speed of construction, and design flexibility, precast concrete panels are an excellent choice for manufacturing and warehousing facilities," says Farmer. "They also can make a difference in the speed of construction, which is often a major concern of the client." ■

For more information on these or other projects, visit www.pci.org/ascent.