Precasters Create Green Plants

— Craig A. Shutt

High-tech water conservation and material-recycling systems help precasters reduce costs and better serve the environment

Precast concrete provides significant benefits for designers looking to improve the environmental friendliness of their project, especially in assisting projects in attaining LEED certification. But precasters today are going beyond providing products with recycled-material content by improving their manufacturing processes. A number of initiatives, involving wastewater conservation, carbon-dioxide reductions, material reuse, and other efforts, are creating more efficient processes and enhancing the final product as well.

Metromont's new batch plant in Hiram, Georgia, for instance, incorporates upgrades that improve wastewater-recycling and aggregate-reclaiming systems. The improvements result from several years of research, including visits to European plants where the systems are already being used successfully, explains John Wenkel, facilities vice president and general manager. The equipment being used combines U.S. automation and controls with European-designed plant machinery.

The efforts updated an existing architectural-concrete batch plant that was transported from a North Carolina site to the Hiram location. The entire batching facility was upgraded with a precast, prestressed concrete superstructure, galvanized structural-steel components, and weatherproof enclosures for the production of structural and architectural precast concrete.

The two batch plants share a mixing-floor level with a common control room, located between the two batch plants. A twin-shaft SIMEM mixing system was installed for producing structural concrete and self-consolidating concrete (SCC). The OMG-Sicoma planetary, high-intensity mixer was installed for the architectural concrete mixture designs.

Equipment Upgraded

The plant additions have spurred additional sustainable-plant upgrades for the equipment for emission-control of concrete dust and processing concrete washout water. The facility also updated its wastewater-treatment system, borrowing a solids-separation process used by the textile- and food-processing industries. The system injects carbon dioxide into the water, followed by an acid treatment controlled by a magnetic-meter monitoring system. The process creates a semisolid byproduct that is chemically inert and clean, recycled water with a balanced pH, which is used throughout the manufacturing facility.

The inert semisolids are removed and transported to a nontoxic solid-waste landfill, where it can be used for their required daily cover or dried to a consistency that allows the material to be reintroduced into the fines storage (sand bin) in the batch plant. These fine, digested (inert, nonsetting) soils can be used to make SCC, which relies on the finest particulates to create the best reaction with ad-

Metromont has updated and relocated a batch plant to Hiram, Georgia, and improved its wastewater-recycling and aggregate-reclaiming systems. The changes reduced the plant's water bill by 90%.

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mixtures to produce superior spread (flow) values. Metromont's quality-control department is developing and testing modified mixtures that will improve the properties of SCC.

The washout-recycling area provides easy access for drivers of concrete delivery vehicles. "Over the long run, the most business-savvy rationale is to recycle 100% of our slurry water and to reduce the amount of waste that needs to be sent to landfills, if cost-effective recycling methods can be installed on site," says Wenkel.

Substantial savings in water consumption can be achieved by recycling wastewater, balancing pH levels of water, and reclaiming aggregates, adds Jay Cariveau, director of business development and marketing. Costs to landfill-production byproducts can be reduced by 50% to 75% through recycling efforts, he notes. The plant's water bill has also been reduced by 90%.

Water-Reclamation System

High Concrete has also taken steps to lessen its impact on the environment. It recently implemented a water-reclamation program for the con-

At High Concrete's Denver, Pa., plant, the company screens washed sand and stone into two bunkers. The aggregate is separated to allow reintroduction of the material into the fine- and coarse-aggregate stockpiles.

Cool Climate Concrete

Cool Climate Concrete, run by The Climate Trust in Portland, Oregon, promotes climate-change solutions by providing high-quality greenhouse-gas offset projects and advancing sound offset policy.

Participating concrete producers submit documentation of concrete-mixture designs, truck tickets, bills of lading, invoices, and computer printouts of cement/concrete they have sold. When verified, producers receive $0.50 per metric ton of carbon dioxide saved.

To learn more about the program, visit www.coolclimateconcrete.com.

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crete-batching operation at its Denver, Pennsylvania, plant. The $750,000 system has slashed water consumption and boosted process efficiencies, explains Mark Aho, vice president of operations.

The system uses vacuum filtration rather than standard settling-basin technology to conserve about 10,000 gallons of water each day that otherwise would be lost to evaporation. In the new process, all washout water is captured from transport mechanisms, batching-process mixers, and trucks. Coarse and fine aggregates are settled out, and cement and other particles are trapped for disposal. The vacuum filtration system also conserves valuable space, allowing it to meet site constraints.

The core of the vacuum system is a horizontal drum with a cloth medium coated with a filter cake of diatomaceous earth. As washout water is pulled through the rotating drum, a knife peels off deposits trapped in the earth. The precaster constructed a system of tanks and spillover devices called weirs to control the water through various stages of treatment and minimize the risk of contaminants escaping into the environment.

The initial challenge in setting up the system was to balance the processed water and then feed the system to ensure that it stayed in balance, Aho explains. “With this portion of the process stabilized, we’re continuing to evolve practices to manage demand with a goal of increasing output without an associated increase in water consumption. The system also has the capability of segregating excess concrete aggregates for reuse according to concrete mix design.”

The company has also joined Cool Climate Concrete, an industry initiative to reduce the amount of portland cement used in concrete by introducing alternative materials to mixtures. The independently audited program is aimed at reducing emissions of carbon dioxide and other greenhouse gasses (see sidebar).

By reducing their use of ASTM C150 portland cement, precasters can help eliminate approximately 12,000 metric tons of carbon dioxide per year toward the program’s goal of 200,000 metric tons by spring 2008 for the concrete industry. High Concrete uses supplementary cementitious materials such as slag and fly ash to maintain concrete quality.

These efforts are but a snapshot of those being introduced around the industry. Architects and designers are finding it easier to specify precast concrete products that not only enhance their building’s impact on the environment but lessen impact in the production process. ■

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

At High Concrete’s plant, cement is removed by a vacuum-filtration process. The cement particles accumulate on the exterior of a rotating drum precoated with a layer of diatomaceous earth. The blade slices the cement off the drum, and it accumulates in a nearby hopper.