The Best in Plants

Editor's Note: Purchasing a new plant, or significantly upgrading an existing operation is one of the most important strategic decisions a concrete producer must make. Producers in these three articles provide insights on several important questions managers and engineers must consider.

Three examples of fast, successful plants follow.

Getting the Details Right
Consolidated Concrete, Omaha, Nebraska

Dave Werner has to leave his Omaha ready-mixed company late one morning for business in the western end of Nebraska. But unlike most people, he won't be driving on Interstate 80 through the Cornhusker State's famous cornfields and cattle farms.

The owner/president of Consolidated Concrete flies his own twin-engine, six-seat plane. But this morning it was being repaired, so he has drive like most other traveler. And it's too bad because the sky was bright blue and the temperature this morning was 60° F, a pleasant anomaly for Nebraska in January.

Still, Werner has to be feeling sky-high these days. His third ready-mixed plant has performed admiringly since it was built six years ago, and the dry batch plant he added in 2003 also has exceeded his lofty expectations.

Consolidated is a conservative producer; it doesn't expand and grow for the sake of expanding and growing. It was founded in 1966 by Werner's father, Phil Werner, and operated only in Grand Island and Hastings, about 150 miles west of Omaha. But Omaha is by far Nebraska's largest city and there was growth occurring (especially west of the city) and concrete to be poured. "The largest market in Nebraska could support another concrete producer," Werner figured.

Making wishes come true

Werner took the opportunity to work closely with plant suppliers CON-E-CO and McNeilus to build a 7-acre plant, about 13 west of the center of Omaha. (McNeilus acquired CON-E-CO late last year.) "We had a wish list of items for 15 years and we finally had a chance to make them real," says Randy Stark, a 16-year veteran of Consolidated and general manager of the Omaha plant.

Werner credits Neil Smith, general manager of CON-E-CO, with providing a road map for the new plant six years ago. "Neil was instrumental in telling us what would work and what wouldn't work," says Werner. "We weren't rushed, so we did a lot of homework."

A site and plant were selected that wouldn't impede any future growth. "We had way more plant than we needed," says Werner. But it took only a little more than four years before the producer decided to install a dry batch plant. "We were getting bottlenecks with trucks sitting in the back, waiting to be loaded," Werner recalls. "We needed more productivity."

Cement silos tower above Consolidated Concrete's new batch plant in Omaha.

PAUL SCHLISMANN

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Top: Gene Braun delivers a load of aggregate in the plant's yard. Bottom: Consolidated Concrete driver Josh Cornett prepares to deliver a load of concrete in the Omaha, Neb., area while plant manager Randy Stark does some paperwork.

So in 2003, Consolidated added a LO-PRO RS dry batch plant to the existing 400SLP central mix plant, each with a capacity of 12 yards. The LO-PRO saved height on the plant. Werner estimates spending between $1.5 million and $2 million in batching equipment alone for the original plant and adding the dry batch plant.

Pushing production

The producer can load 40 trucks per hour out of both plants "and that's not pushing things," says Stark, adding this is "a good even flow on a routine basis."

It takes three minutes to load each truck, amounting for 400 yards of concrete per hour. "We can get more than that," adds Stark. "We never even pushed it to capacity."

Werner strongly suggests not rushing into building a new plant. "The more time you plan, the better," he says. "We spent an awful lot of time on the details." Stark also adds anyone planning a new plant should "see what other people are doing. Take your time and don't be afraid to ask a lot of questions." Werner and Stark visited other CON-E-CO plants in St. Louis, Denver, Las Vegas, and Ft. Wayne, Ind.

In walking around the plant, CON-E-CO's Smith points out all of the little nuances that add up to greater production, easy maintenance, and a better working environment for the plant's 60 employees.

The controls directly inside the plants are user friendly because they are easy to reach for adjustments and repairs. The conveyors are dual drive, so if a drive goes down, they still can operate. Aggregate conveyors have hoods. Shielding conveyors from wind and UV rays saves 30% on wear and tear, Smith estimates. Handrails on the catwalks along the newer dry batch plant are made of galvanized steel, so they don't have to be painted red like the older ones built in 1998.

Traffic flow

The plant's design is sensitive to traffic flow. A ready-mix truck can pull into the yard and should never have to back up. The producer spent much time understanding traffic flow. McNeilus supplied all of the plant's 40 ready-mix trucks. Consolidated is in the process of replacing the original Bridgemaster and SMS Sliding Mixer System trucks it bought when it started operating in Omaha.

The plant is allowing Consolidated to do in Omaha what producers nationwide have performed. The vast majority of Consolidated's mixes are of the two-aggregate variety. The producer has made self-consolidating concrete with success and "a lot of color [concrete] goes out of here," says Stark. The producer just finished working on its third Wal-Mart store. The giant retailer is using colored concrete for all of its stores' floors. Consolidated uses liquid batching for its colored concrete.

Adding the dry-batch plant to the 7-acre Omaha site in 2003 has maxed it out, with no more room to expand. There also are no plans to build another plant in Omaha or anywhere else, for now. That suits Werner just fine. "We're letting our customers determine how big we get and the value we provide," he says.

Werner and Stark struggle to think of anything they would do differently if they had to build the Omaha plant all over again from scratch. "You see the technological advances of the last 20 years in the new equipment," says Werner.

— Tom Bagsarian

Slurry in a Hurry

Westroc Inc., Pleasant Grove, Utah

Westroc Inc., a producer with seven plants in Utah, installed a slurry mixing and batching system by Hydromix Inc. at one of its seven locations four years ago. The goal at the time was to control dust. To the producer's delight, the installation not only controlled dust, but also took valuable seconds off truck loading.

About 250 gallons of water a minute is added to each 10-yard load. The slurry mix saves 30 seconds of load time, with 80% of the water going in before the sand and gravel and the remaining 20% at the end.

"It makes it faster because you're not waiting for your 80% headwater," says Lee Anderson, concrete production manager for the producer based in Pleasant Grove, Utah. "It make a big difference for us. Your plant might not be going all the time all daylong, but you have spurts at 6 in the morning when everyone wants to pour. Then you have to be maximized. Thirty seconds a load is a great time savings."

With Westroc's front-discharge mixers, it typically took longer for the aggregate to fall to the bottom of the barrel. "On the front-discharge mixers, your material has to be pulled into the back," says Anderson. "With rear-discharge, you put your aggregate in and it pretty much falls to the bottom. With Hydromix, our front-discharge trucks take the aggregate faster."

Faster loading

Loading time was cut from 18 seconds per truck to 11 seconds, says Anderson. When the mixer can't take the aggregate faster than it's being loaded, the excess falls all over the truck and creates a mess. Drivers like the slurry mix because they don't have to take so much time cleaning their vehicles. The producer has 45 trucks at all of its locations.

This was the primary reason Westroc installed a second Hydromix slurry machine in 2003.

Westroc also doesn't have to mix the concrete as long to determine the slump. Since the cement is already wet, it has less to absorb on the way to the jobsite, explains Lee Middleton, technical manager for Hydromix, based in Sherwood, Ore. Typically, the driver doesn't have to wait long after loading to know what the sump is.

There are 19 Hydromix slurry mixing systems operating in the world, including three in Singapore. We fill a niche between a dry batch plant and drum plant," says Don Macaulay, president of Hydromix. "We fit in where we're almost a central mix plant, and for a lot less money." Bigger drum plants might require 200 to 300 hp, compared to about 60 hp for a Hydromix installation.

Hydromix supplies a "ribbon-feed," says Macaulay. "All of the materials are going into the truck continuously in the same proportions. That's where we pick up speed in loading. The truck also turns into more of an agitator than a mixer. The sand, gravel, cement, fly ash, water, and admixtures are all going in at the same rate."

— Tom Bagsarian

HYDROMIX INC.

TOM BAGSARIAN

Above: Slurry created by a Hydromix machine is fed into a Westroc truck. Right: The equipment can be retrofitted into existing dry-batch plants with little modification.

A plant manager can make simple adjustments to improve his batching speed, explains Don Beers, engineering services manager for Rinker Materials.

MATTHEW PACE / GETTY IMAGES

A Simple Concept

Rinker Materials, Ft. Myers, Florida

Fast is a relative term. A loading time that may be fast to one producer may seem to be a snails pace to another. But how can the plant manager, with only a small capital budget for improvement, make a difference in his batching speed? Efficiency is one key to making a batch plant faster. A smooth running operation, whether it is computer-controlled or manual, can help save time and money in the long run.

Changing the set-up of a few components may be another option. Increasing the capacity of a conveyor or the design of a chute can resolve some loading problems. And adding a limit switch or camera in the plant can ease production problems.

So how, specifically, do you speed up your plant? "A 'fast plant' is a simple concept and easy to achieve," says Jerry A. Kyckelhahn, applied technology consultant to the ready-mixed concrete industry based in Palm City, Fla. "Assuming an efficient design, a fast plant requires only bigger gates, bigger belts, sufficient weigh hoppers, an optimized drop alignment into the mixer and slope of the truck, and adequate controls."

Kyckelhahn has worked on a number of ready-mix operations including Keyes Concrete Industries to improve plant speed and efficiency. These plants are achieving fast dry batching times, and they are dones so while remaining clean, being environmentally friendly, and operating with only two people.

"Operational batch times for a full 10-yard load are regularly around 80 seconds," explains Kyckelhahn. "This remarkable performance is achieved through the introduction of technology not only into the

plant, but also into the site systems necessary to make the plant effective. This includes water control systems, environmental controls, electronic monitoring, and an adequate dispatch environment."

Monitoring with computer systems

Fully utilizing the capacity of the batching computer is key to making batching faster. By installing quality sensors and diagnostic controls, a plant manager can learn at a second's notice where the plant problems lie.

"An exciting new development, near and dear to my heart, is the computer print out of the record data of the plant," says Don Beers, engineering services manager for Rinker Materials, which has numerous large production plants in Florida. "The batching computer records and time stamps all functions of the plant during the batch. We can look at every batch function in milliseconds. When the gates open, when they jog, everything. The manager can now get valuable information back from the plant."

One Rinker project that Beers is very proud of is the third-generation Merts batch plant recently erected at their Ft. Myers facility. This plant is very compact and unitized, and can boast a daily average batching time of 115 seconds, with its lowest time at 83 seconds (weigh up and discharge of 10 cys). The introduction of computerized equipment has helped speed batching.

"The Rinker plants exclusively use one style of batching system in all ready-mix plants," says Beers.

For example, an Internet-based diagnostic program in the works can tell the operator that gate No. 2 is sticking, the air pressure is low, or that there is a leak. That kind of diagnostic is important as it can help the operations manager by telling him exactly what is wrong in his plant.

Kyckelhahn agrees. "The future of dry batch plants will first recognize the need for the introduction of total systems to use this high performance while maintaining minimal staffs. This will involve the implementation of technology throughout the site, not just in the plant," he says.

The heart of the matter

Aside from computers, what can the typical producer do to make his plant faster? Both Kyckelhahn and Beers offer a few things to try.

When designing the Ft. Myers plant, Beers had to consider several design strategies. "Introducing the material into the mixer is the most problematic area," he says. "If you can't get the material into the truck, you can't get the speed. A properly designed charge hopper is the key to this problem. It is solved by carefully funneling material into the truck," says the engineering services manager.

A laminar, or smooth, flow of aggregate should be a key goal when upgrading a plants design. Although the material is not liquid, you should think of it like a fast river. Anything that causes turbulence, or disturbs the flow, will slow you down.

Hoisting the material up to a plant's overhead storage bins is another problem, continues Beers. "You have to have sufficient belt widths and gates to feed materials fast enough to get up there," he says. "You have to make allowances for feeding more per second." Both Rinker and Keyes have moved to larger belts in many of their plants, using ones as large as 36 or even 42 inches.

The shape of the aggregate weigh batcher is also important-it needs to conform with the belt it feeds. A key item for increasing plant speed, says Beers, is to select an aggregate weight batcher with steeply sloped sides. There's less restriction from material hitting itself as it drops.

The next item to consider is the cement weigh batcher. "The batcher must breath. Aeration is key," says Beers. As the mixer fills, air has to pass through without dust. As the hopper discharges, the material flow has to freely pull air into it and not interfere with the cement actually emptying out of it. It is the dust that creates the problem here.

— AMARA ROZGUS

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The flow of aggregate and other materials should mirror the smooth flow of a river.