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Trenwa updates third location with new batch plant



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Producing consistent, high quality self-consolidating concrete (SCC) can be tricky business. When you get it right, it's a beautiful thing. It flows smoothly into every nook and cranny giving precast products an almost architectural surface finish. Get it wrong, which is easier to do than getting it right, and you have a big mess on your hands. For several years, the Trenwa, Inc. manufacturing plant in Dacono, Colo., USA, just north of Denver, had a love/hate relationship with SCC. The plant was built in 2001 and included a new batching plant that featured a centrally located horizontal, spiral blade mixer to supply the firm's precast production floor. Trenwa specializes in precast products for underground utilities, wastewater and other industries. The 50-year-old firm is a family business headquartered in Ft. Thomas, Ky. and with additional manufacturing sites in Florence, Ind. and Lakeland, Fla. Like most precasters, Trenwa was still using conventional concrete mixes ten years ago when the firm's Colorado plant was built and at its Florida plant. Conventional manual vibration was needed to gain the deep penetration of the mix into the reinforcement lattice in its precast forms.

■ Hank Giles,
Advanced Concrete Technologies (ACT), USA ■

SCC experimentation yields mixed results

A few years later, Trenwa began experimenting with SCC mixes in Colorado and Florida. However, the results were less than satisfying with the original batching systems at those locations. "Try as we might, it was nearly impossible to get the flowability we really wanted in order to eliminate the need

for vibration," explains George Schurr, Trenwa Executive Vice President and son-in-law of co-founder Wes Dicken. "Our quality and strength were good, but we had to use too much cement in our mix to hit our strength mark. And, we still had too many bug holes. We knew we could do better. We just had to bite the bullet and make the investment to a better batching system." In 2006-2007, the firm expanded and upgraded its Lakeland, Fla. location, investing \$500,000 in new cranes and a new batch plant. The firm chose the SmartMix

1125 batch plant (figure 1) from Advanced Concrete Technologies (ACT) of Greenland, N.H., USA, which features a 1.0 cubic yard output, HPGM-1125 planetary counter-current mixer (figure 2) made by Wiggert+Co of Germany. ACT is the North American division of Wiggert+Co and Würschum.

In 2010, the firm chose the same batch plant from ACT for its new facility in Florence, Ind. "We had the chance to build from scratch in Florence, so we decided to begin standardizing on the ACT batch plant since it had worked out so well in Florida," Schurr notes. "The system uses microwave moisture probes in the sand bin and the mixer floor to continually monitor and adjust the batch yield and batch water content to meet our specifications. We get consistent, high quality mix every time."

Early this year, following the 10-year anniversary of Trenwa's Colorado facility, the production team was ready to jettison the original batch plant. "That old mixer was on its last legs, held together with bailing wire and duct tape," Schurr notes, only half kidding. "Between the increasingly frequent breakdowns, lack of consistent control over SCC variables, and the continuing need to vibrate our molds, we decided enough was enough. Demand for our product in that region continued to be strong so we knew that this investment would pay for itself, just like it had in Florida and Indiana."

Major investment tempered by market strength

Keith Riggs, Trenwa President and son of co-founder Charles Riggs, believed strongly that the firm's investments in plant modern-

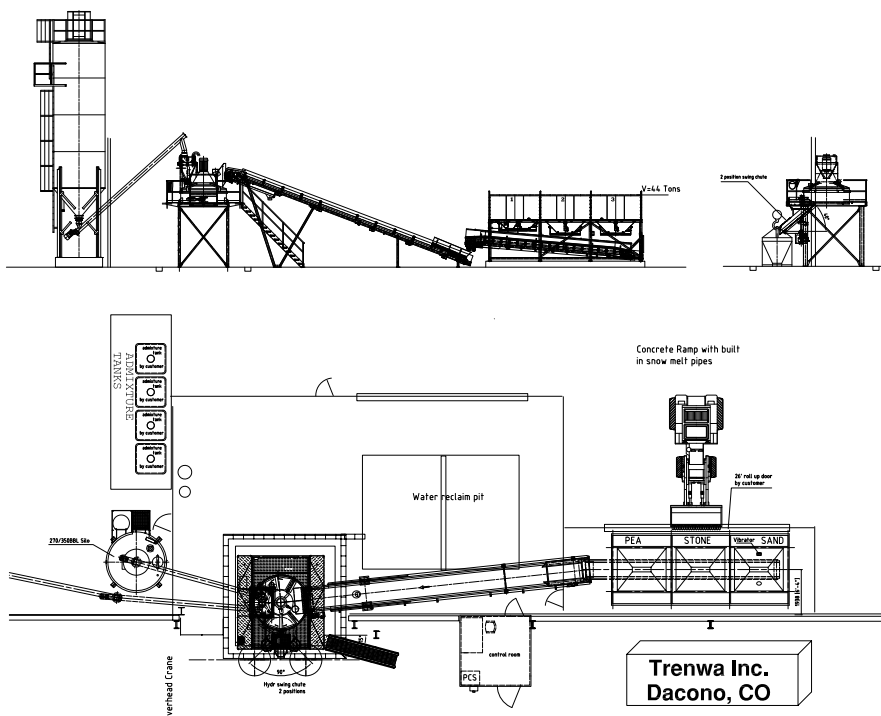
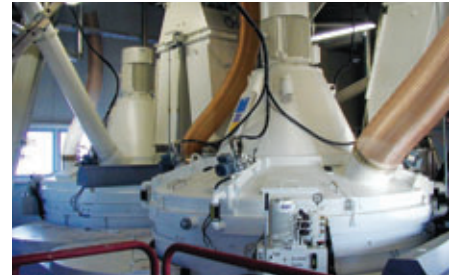
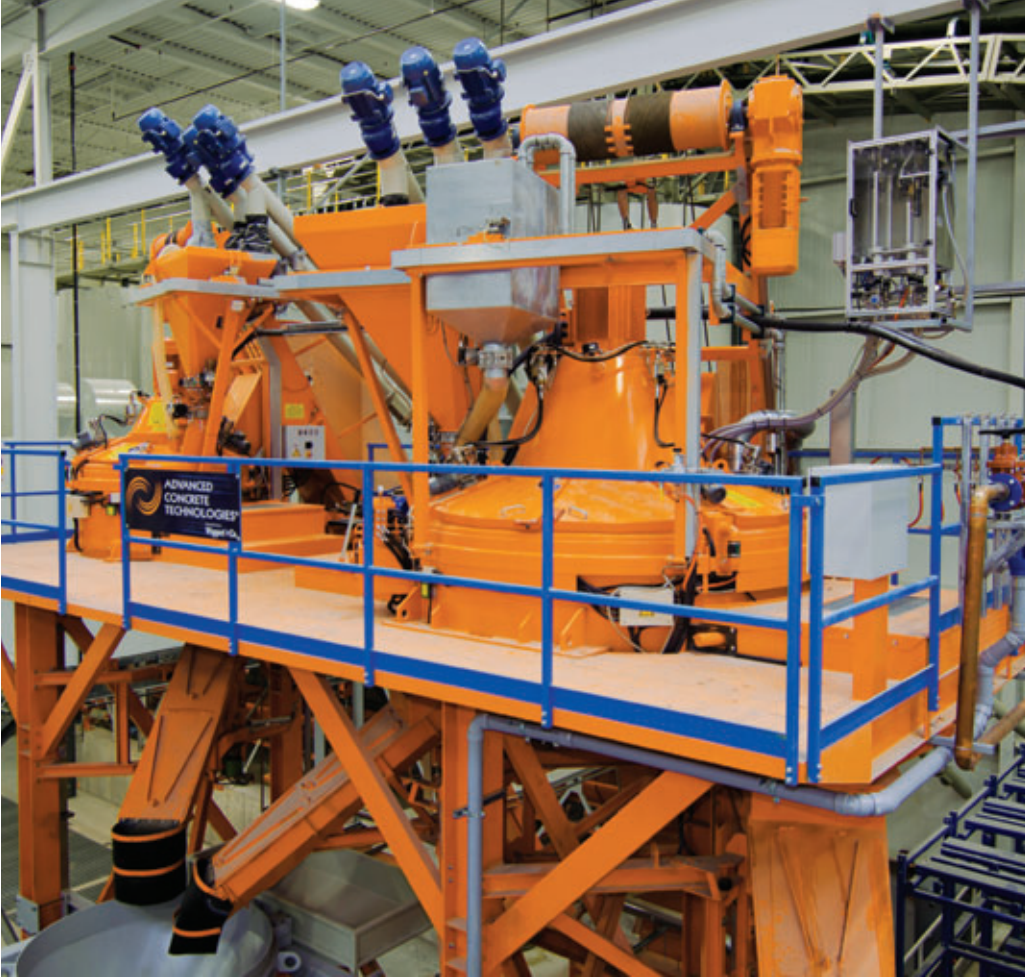


Fig. 1: Views of Trenwa Colorado's new ACT SmartMix batching plant, showing cement and admixture storage at left, mixer platform, conveyor, and aggregate storage.



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Fig. 2: Wiggert HPGM 1125 mixer with aggregate batch transfer conveyor (at left) charges the mixer. The HPGM 1125 mixer is equipped with an automatic high pressure mixer cleaning system. This system saves Trenwa about 30 minutes per shift in clean out time and ensures good housekeeping for longer mixer life.



Fig. 3: Fully automated SmartMix 1125 batch plant with high shear Wiggert planetary HPGM 1125 mixer provides one cubic yard of output every 2.5 minutes. Two-position hydraulic swing chute provides flexible filling options. White crane bucket in front of mixer and green trench forms in foreground.

ization, including the purchase of ACT SmartMix batching systems for all three of its production facilities was the right decision. "We're a medium-size producer with a national presence," Riggs observes. "While our sales have been strong, even through the latest economic crisis, this was a major investment for us. Between Colorado and Indiana, we were looking at a total investment of more than \$800,000 in the span of 18 months. However, we're confident that the quality of the ACT batch-

ing systems and the quality and consistency of the concrete mix they enable us to produce will allow us meet our production goals now and for the foreseeable future." The ACT SmartMix batching system installed at the Trenwa plant in Colorado (and very similar to the Trenwa plants in Florida and Indiana) includes the following components and features:

- SmartMix1125-3-PCS turnkey mixing and batching plant (figure 3) capable

of 24 cubic yards per hour;

- High shear planetary HPGM 1125 mixer with 1 cubic yard consolidated concrete output equipped with hydraulic swing chute for filling two crane buckets;
- Three compartment aggregate bins with 44 ton capacity charged directly by front end loader (figure 4);
- Two cement silos, one pre-existing and one supplied by ACT, for Portland III and fly ash for more economical SCC production;



Fig. 4: Lee Wheeler, Trenwa plant production manager uses a front end loader to charge aggregate bins outside the recently upgraded Colorado plant. The bins store crushed stone, sand and pea gravel for a total of 44 tons capacity.



Fig. 5: The ACT SmartTouch control is a PC-based PCS Control System situated in an unattended control room. The PCS control produces precision concrete for high output quality SCC concrete. A simple remote call station is mounted by the mixer platform and is the only interface the crane operator needs to call a batch of concrete. The user-friendly PCS control records every batch for quality assurance and easier inventory accounting. Hydromat mixer-mounted microwave moisture probe and Hydrotester aggregate bin moisture sensors provide real-time water/cement ratio adjustment for SCC accuracy.

- Automatic high pressure mixer cleaning system to reduce cleanout time and extend mixer life—Trenwa reports that this system saves them about a half hour per day and saves on maintenance costs;
- PC-based PCS Control system with user-friendly interface and remote call station provide flexible control, maintenance reminders, recipe recall, complete production history, and real-time batch control;
- Hydrotester aggregate moisture probe located in sand bin automatically adjusts batch weight in order to maintain mix design and batch yield; and
- Hydromat microwave mixer probe automatically reads mix moisture and corrects final batch water quantity to maintain perfectly consistent W/C ratio each batch.

Turnkey plant is virtually plug and play

"We worked closely with the ACT engineers on the design and layout for the Colorado installation," Schurr relates. "We had an idea for it, but ACT came back and suggested an alternative that really

saved space and optimized our production. They sent us AutoCAD drawings of the proposed layout showing exactly where everything would go. It was great."

The ACT SmartMix batch plant was shipped from Germany and delivered to the Trenwa Colorado facility in mid-June. "It took about two weeks to install and start up the new batch plant," explains Trenwa Colorado Production Manager Lee Wheeler. ACT also provided installation oversight and trained Trenwa operators on the new plant. "We had already prepared wiring for it and built an enclosure on the outer wall to cover the mixer and bins. We placed the mixer in an opening through the wall, just down from the old batch plant. We went from the old plant to the new plant with only a day of actual downtime. The first batch we produced with the new ACT plant was perfect. We expected we would have to produce several trial batches and probably throw them away. We used the first batch! It was plug and play."

Every SmartMix compact batching plant is prewired, pre-plumbed, and tested at the factory. "We believe it reduces the risk by using a



Fig. 6: Consistent SCC mix flows from the ACT HPGM mixer into a crane bucket at the Trenwa Colorado precast plant. Operators can call for or adjust batches from a remote call panel located near the mixer platform. High flowability of SCC has allowed Trenwa to eliminate vibration and is helping to reduce the average shift from 10 hours to 8.

plant like the SmartMix from ACT," says Schurr, recalling their first purchase of an ACT plant for the Florida facility. "They test it at the factory, break it down, and ship it. We just had to set it up, attach the power, compressed air and water and we were ready. We considered other systems, but most of those came as separate elements that had to be integrated on site. That just seemed too risky." Trenwa supplies its products throughout North America from its three manufacturing sites in the U.S. West, Midwest and South. Product quality is critical to its utility customers and others. The consistency and volume of SCC that the firm's ACT batch plants produce is providing considerable benefits, including a boost to the bottom line.

The benefits of the batching accuracy and repeatability provided by the SmartMix countercurrent mixer and PLC-based SmartTouch controls (figure 5) include extreme water/cement ratio accuracy, reduced cement use, reduced waste, and product flexibility. "Two critical benefits we get from ACT batching systems are SCC mix quality and mixing speed," Riggs says. "We no longer have workers standing around waiting for mix to be delivered. It comes as fast as they need it and it's perfect every time. No more vibrating the forms either which also saves time."

At all three Trenwa plants, three aggregate bins are loaded with round rock, ¾ inch fractured rock, and sand. One cement silo is loaded with Type III Portland for high early strength, which helps the firm's precast products resist damage during form stripping, transport and installation. The Wiggert HPGM high-speed countercurrent mixers used in all three plants can produce batches at the rate of 2.5 minutes per batch, including mixer charging, mixing and discharge (figure 6). The Colorado and Florida plants are saving about 2.5 minutes in mixing time per batch over the batch plants that were replaced.

Fast, accurate batching saves on overtime, other costs

"We like to spend a good part of the day preparing to pour," Wheeler explains. "When we are ready, we want to pour continuously until we're done—one big push. Before, our mixer was too slow to support us. We had to wait. Now, we can go as fast as we want without having to vibrate the forms. We've cut back on overtime dramatically for average production weeks. We used to average 10-hour shifts, now we get the same work done in eight hours. We can save up to 140 hours per week in overtime now. That's huge!"

Schurr also notes that the extreme accuracy of the new plant's SCC batching capabilities has resulted in very high first day strength that is allowing the firm to de-mold sooner and with greater confidence. Occurrences of breakage and cracking have been virtually eliminated and compressive strength has gone up by 1,000 psi, which presents a savings opportunity for the plant.

"Without changing our mix recipe, we immediately saw greater flowability and strength, which I attribute to the accuracy of the control system and counter-current action of the mixer," Schurr observes. "We will be experimenting with our mix design very soon and expect that we can save at least 75 pounds of cement per cubic yard going forward. We'll be looking at adding fly ash as well, which we expect will further reduce our costs."

Trenwa's Schurr says, "When we add it all up, we're looking at about a 5% savings in costs thanks to our new ACT batching systems. We get a finish on our products that looks like drywall it's so smooth. There are no bug holes. The appearance on the truck when our product arrives on the job site is critical, no doubt. The customer judges you on what they can see. That combined with the increase in compressive strength and early strength is very gratifying." ■

FURTHER INFORMATION



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