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Wet cast innovator cuts costs and increases output with cornerstone automation



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It's no wonder homeowners and contractors alike continue to turn to manufactured stone and stone veneer products to improve the look and value of residential and commercial structures. Manufactured stone is consistently ranked among the top performers in return-on-investment (ROI) in Remodeling magazine's annual Cost vs. Value Report. In 2018, stone veneer was ranked the No 1 remodeling project with an average ROI of 97.1%. In some regions, the ROI spiked even higher, including the Pacific U.S. region at 125.5% ROI. Manufactured stone has been produced for decades; however, in recent years demand has increased due to the advantages it offers to homeowners and builders. One of the advantages of manufactured stone over brick or natural stone is reduced weight of about one-third to one-half. This makes manufactured stone veneer suitable for application on most homes without major structural modifications. Manufactured stone is also easier to install, reducing the time and skill required to achieve optimal results.

Wet cast pioneer

One of the leading innovators of wet cast manufactured stone is EP Henry Corp. Based in Woodbury, New Jersey, USA, the firm is the oldest family-owned and operated manufacturer of precast concrete products in North America. Founded in 1903 by Edward P. Henry, EP Henry manufactures a wide range of paving stone and retaining wall products, including pavers, slabs, permeable pavers, wall systems, cast veneer stone, and accessories.

Along with its Woodbury plant, EP Henry also operates manufacturing facilities in Wrightstown and Vineland, New Jersey, as well as Parker Ford, Pennsylvania, USA. The firm's market encompasses a 10-state region along the mid-Atlantic states and extending west to Ohio.

While EP Henry's four plants employ high levels of automation for most production operations, one type of product - corner-



Fig. 1: EP Henry Cast Stone Wall and Cast Stone Wall face shells in Aspen color ...



Fig. 2: ... Cast Stone Wall in Breckenridge color ...

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Fig. 3: ... Double-Sided Cast Stone Wall and Cast Stone Wall face shells in Breckenridge pattern ...



Fig. 4: ... and Cast Veneer Ledgestone in Breckinridge pattern (mortared).

stones for cast wall systems - had eluded automation attempts for many years. That is until 2017, when demand for its wet cast single- and double-sided Cast Stone Wall (figs. 1-4) threatened to outstrip the capacity of its key Wrightstown production line. "We were using a primarily manual process to create our cornerstone pieces," notes John Ravelli, EP Henry Vice President of Manufacturing. "We would hand load individual molds on a vibrating table and remove excess ma-



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Fig. 5: The Automacad-designed cornerstone production line was pre-assembled at the Automacad facility near Montreal, Canada, and shipped to EP Henry's Wrightstown, New Jersey, USA, plant for final installation.



Fig. 6: Each custom-made mold is held in a steel carrier. The molds are produced in-house by EP Henry and the steel carriers are manufactured by a local metal shop from the design developed by Automacad. The mold shown here contains stone veneer pieces that have cured overnight and are ready for demolding.



Fig. 7: Cured precast stone veneer pieces are automatically freed from their molds in the Automacad demolding system. Workers move the freed products to a conveyor immediately in front of the mold, which carries it to a packing station.

terial by hand as well. There was a lot of waste and it was very labor intensive. We had to run two shifts with 10 workers on each shift to meet demand."

Ravelli estimates that up to 60% of the concrete mix used was wasted in this manual wet cast process. "We had to let it set for a time before we could screed the molds. By then, the mix we screed off was not reusable. We were also having trouble finding labor. Our two shifts were maxed out in terms of production output."

Help from an automation expert

In mid 2017, EP Henry sought out the help of Montreal, Canada-based Automacad, a firm that specializes in creating innovative solutions to solve manufacturing challenges in multiple industries. Automacad has extensive experience creating custom-designed equipment for dry and wet cast precasters throughout North America.

"Of course, we knew of EP Henry for many years because they are truly pioneers in wet cast production," says Automacad president Louis Hebert. "When we met with John and his staff and saw how they were producing the cornerstone pieces it was a perfect opportunity for both our companies. We had this concept in mind for cornerstone production for many years and we were looking for the right customer. We even had a prototype built before we met them. It just needed to be refined and tested in a real-world situation."

The Automacad engineers worked for about six months to build a complete wet-cast cornerstone production system at its facility near Montreal (fig. 5). The automation line includes the following systems:

• Automatic destacker: Allows stacks of steel carrier frames holding cornerstone molds to be dispensed as needed by the production line. For the EP Henry system, the production day begins with a stack of carriers containing product that has been cured in its molds overnight.

- Demolding station: This unique patent-pending system automatically lifts the mold filled with cured product (fig. 6) and moves it to a demolding station. Here the polyurethane molds are gently bent with precision following each product line's requirements. This process releases the cornerstones so that they can be easily removed by a worker (fig. 7) and placed on a finished product conveyor which allows the product to be stacked on pallets. Once emptied, the molds are cleaned and automatically placed back in their steel carriers in order to move on to the next station.
- Release agent and color application: The steel carriers and cleaned molds are moved automatically from the demolder along a conveyor where release agent and color pigment is added to the molds. Color pigments are added by hand to achieve a natural randomness.
- Automatic filling station: A 1.5 cubic yard (1.15 m³) hopper (fig. 8) is filled from a forklift equipped with a

concrete bucket. The loading system dispenses the correct amount of mix into each mold cavity (fig. 9). The mold is vibrated to eliminate voids and achieve the natural details that make wet cast stone so distinctive. Once compacted, the mold is automatically screed and any excess is retained by the filling head and used to help fill the next mold. This automatic system has reduced concrete waste from 60% to about 1%.

• Automatic stacker: Steel carriers with loaded molds are stacked from the bottom up. Complete stacks are then transported by forklift to an indoor, humidity and temperature controlled curing area where they are left to cure overnight.

"We ran the completed system here at our facility for about two months before we moved it to the EP Henry plant," explains Automacad's Hebert. "John and others from EP Henry came up to Montreal to see the system in action and discuss design details."



Fig. 8: Concrete hopper and dispensing system is readied for installation and testing at the Automacad facility near Montreal, Canada. A special feature of the Automacad design is that all the parts in contact with concrete are easily removed by a lift truck so that they can be washed off line, at a washing station, thereby saving clean-up time, improving the cleanliness of the equipment, and resulting in a safer environment for employees.

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Fig. 9: Here the concrete hopper (gray) is mounted above the loading and screed system (blue) as steel carriers loaded with polyurethane molds move down the line. Each mold is filled, vibrated and screed off. Any excess mix is saved and loaded into the next mold thereby reducing waste to about 1%.

A new chapter unfolds

The new cornerstone production system was installed in EP Henry's 135,000 ft² (12,542 m²) manufacturing facility in Wrightstown, NJ, in January 2018 (fig. 10). The modular preassembled production line took about a week to install and calibrate.

EP Henry produces its own molds based on real local stones that have been carefully selected and shaped to fit together in natural color patterns. Mineral-based pigments are handapplied to the molds to achieve a natural randomness. The pigment becomes integrated into the lightweight concrete mix when the molds are filled and vibrated. This process produces a durable product that is resistant to scratching and weathering.

The unique steel carriers required for the automated system were fabricated by a shop near EP Henry's Wrightstown plant based on the design developed by Automacad. Each carrier



Fig. 10: EP Henry's manufacturing facility in Wrightstown is home to the firm's new automated cornerstone production system.



Fig. 11: EP Henry Cast Stone Wall corner veneer ...



Fig. 12: ... Cast Stone Wall random face ...



Fig. 13: ... and Cast Stone Wall full face veneer.

can hold 12 or more cornerstones (figs. 11-13), depending on the product line being produced. Production is limited to the number of steel carriers available.

Currently, the plant uses about 150 carriers enabling the plant to produce as much product in a single shift as it took two shifts to produce using the old manual methods. "The automated system has allowed us to reassign and reallocate workers to more productive duties," Ravelli notes. "We've reduced our manual processes for cornerstone production by more than half and cut the production time by half as well."

Demanding corners

The increased output of cornerstones is enabling EP Henry to easily meet current demand and provides the capacity to increase production in the future as demand rises. "We provide a unique product in the industry and the production of corner pieces has traditionally been a pinch point for us," notes EP Henry vice president of sales Mark Fuss. "Contractors and homeowners use a lot of corner pieces in almost every project. For instance, not only do they need cornerstones for 90 degree corners, but also for pillars and piers, which are almost entirely made of cornerstones."

According to EP Henry's Ravelli, the automated cornerstone production line has also led to reduced product breakage. "When production was based on manual labor, there was more product breakage – as much as 20% at times. Now, particularly because of the automated demolding system, we have less than 5% breakage."



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He adds: "With our savings in labor and reduced waste, we estimate that our investment in the automated cornerstone system will pay for itself in about two years and as we close in on that date it looks like that will be the case. Any time you can pay off a capital investment in less than three years, that's a good thing. We would definitely work with Automacad again should the opportunity arise."

Eric Long, EP Henry President, is not only pleased with the system's ROI, but also for the flexibility and quality it provides. "We've automated the processes that made the most sense and we're achieving consistent quality and the quantities we need to meet market demand. We have the flexibility to add new products or more of the same any time we need it."

Long continues, "This is our fifth year with the cast stone product line and it has been an evolution for us as we have moved from production that required a significant amount of labor and manual manipulation to a much more automated system."

FURTHER INFORMATION



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