

PLUS! Smart Concrete // Hand Tool Safety // NPCA Convention Wrap Up

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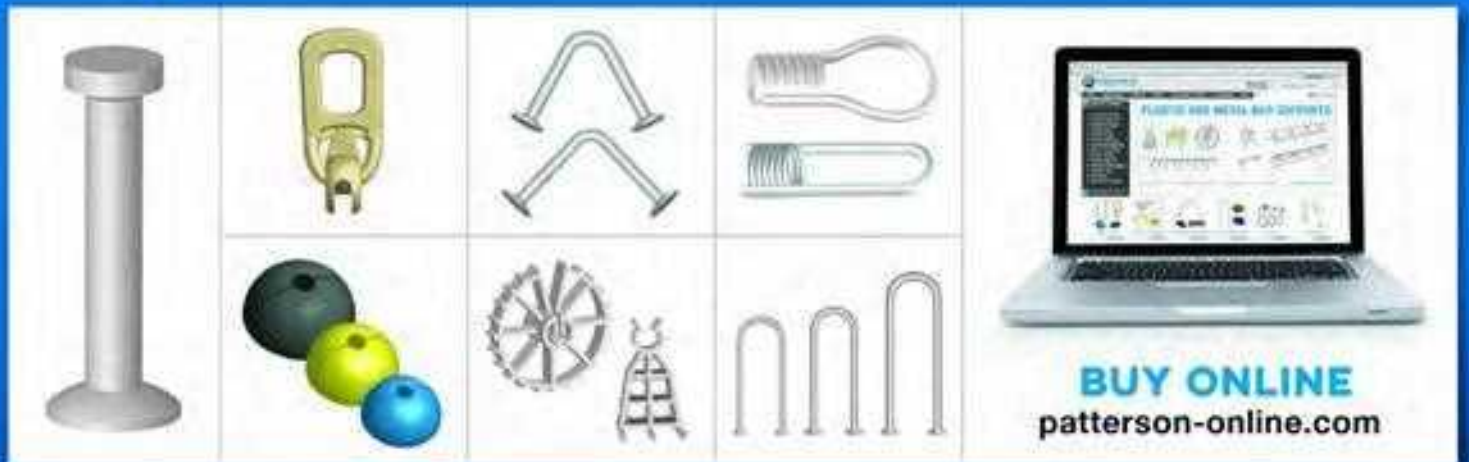
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CHAIRMAN'S CHOICE

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Precasters are using **aerial drones** to showcase their work, locations and products.

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On the Cover:

Shea Concrete Products, headquartered in Wilmington, Mass., manufactured three 10,000-gallon precast concrete tanks for a local brewery.

photo by Stephen Chmielecki

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Questions from the Field

Questions from the Field is a selection of questions **NPCA Technical Services engineers** received from calls, emails and comments on blogs or magazine articles on precast.org.

If you have a technical question, contact us by calling (800) 366-7731 or visit precast.org/technical-services.

Daniel writes:

I'm working on a six-story mid-rise building in Annapolis, Md. It was built in the late 1960s. The walls are 12-inch concrete masonry units and the floors are flanged precast slabs that start at 2 inches thick and increase up to 18 inches thick at the ribs. I want to verify if this system has a one-hour fire rating.

NPCA Technical Services engineers answered:

ACI/TMS 216.1-14, "Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," states, "Concrete bearing or nonbearing walls, floor slabs, and roof slabs required to provide fire-resistance ratings of 1 to 4 hours shall comply with the minimum equivalent thickness values in Table 4.2."

The equivalent thickness of slabs, walls or other barrier elements with surfaces that are not flat are determined in accordance with sections 4.2.2 through 4.2.4.

Section 4.2.3 states, "For flanged walls, and floor and roof panels where the flanges taper, the equivalent thickness shall be determined at the location of the lesser distance of two times the minimum thickness or 6 inches from the point of the minimum thickness of the flange."

In your case, if the minimum thickness of the slab is 2 inches, you would need to come over 4 inches ($2t$) and measure the thickness at this location. This would constitute your equivalent thickness. Assuming the worst case

in Table 4.2 and using siliceous aggregates, this thickness would have to be 3.5 inches to provide a one-hour rating.

A sample could also be tested per ASTM E119 - 16a, "Standard Test Methods for Fire Tests of Building Construction and Materials."

The full ACI/TMS 216.1-14 is available at <https://www.concrete.org/store/productdetail.aspx?ItemID=216114>.

Chris writes:

I just had my first experience testing a manhole via a 10-inch vacuum, and it did not go so well. We hired a local contractor who does this daily. My first structure was a 16-foot-tall double drop manhole with 10 feet of backfill, which passed with flying colors. However, we were not so lucky on the second structure, which was 12 feet tall with 12 feet of backfill. On the outlet side of the manhole, I had a 2-foot, 4-inch piece of pipe that connected into the boot placed into the manhole. The balloon plug was placed in this piece but not past the joint connecting it to the next full length of pipe. Testing began. I was told at 6 inches that it failed. The lid was removed to look inside, and the 2-foot, 4-inch piece had been sucked out of the hub and pulled completely into the manhole. Having pulled these joints apart in the past, I know it takes a good amount of force to make this happen. I am now digging this up and will reinforce this piece so this does not happen a second time. What is the formula for figuring the necessary vacuum to be pulled to equal a true 10-inch vacuum? Better yet, can you give me that number along with the math it takes to get it? The water table is not an issue. Therefore, there is no hydrostatic pressure to factor.

NPCA Technical Services engineers answered:

We hope this experience will not keep you from further work requiring vacuum testing. The reason for conducting this test is similar to air testing for pipelines. The owners are looking to obtain the most leak-resistant sewer system and a means to verify that.

The standard you are likely being tested to is ASTM C1244, "Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill." The original intent of this standard was



to test structures prior to backfill. For certain installed conditions, the test criteria can exceed the range of the resilient booted connection. However, that is little comfort to sewer owners who want to test a completed system to assure the backfilling process didn't create some type of defect. Currently, ASTM C13 is developing a new standard to address vacuum testing of manholes after installation. You can read more about the new standard on page 6.

The problem you encountered with a pipe "implosion" is strictly a power of pressure issue. Whether compressed for positive pressure or sucked down to create a vacuum for negative pressure, air will exert a force against an object adjacent to it with a different pressure zone. In your case, the manhole interior at the known failure was at 6 inches of mercury (Hg), which equates to roughly 3 psi of reduced differential pressure to the outside of the manhole (1 inch of Hg = 0.49 psi, or approximately 0.50 psi). Therefore, when the 30-inch-diameter pipe was plugged, it had a differential force of 3 psi trying to push it into the manhole. That is measured to the pipe's outside diameter. If this 30-inch-diameter pipe is a B-wall RCP, the minimum force is 3,225 pounds using the equation: Outside Area of Pipe (square inches) x Force (pounds/square inch).

If this is SDR35 PVC, that force is reduced to 2,412 pounds, but this pipe has less weight and resisting friction than the concrete pipe. Regardless, if either pipe is not adequately blocked off with adequate struts, it will likely move, as you have proven. A similar situation can occur with a pipeline tested with positive pressure. In this case, the pipes are sealed at both at ends and pressurized, pushing the pipes apart and into the manhole structure if it is not adequately blocked.

To learn more about vacuum testing, visit precast.org/vtmanholes. **PI**



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The Evolution of MANHOLE VACUUM TESTING



ASTM C13.06 working to develop a new standard.

By Eric Carleton, PE.

For the past five decades, municipalities have made installing watertight sanitary sewers a priority. The movement toward achieving a tighter system originated from the Environmental Protection Agency when it provided federal grant money for the upgrade of municipal sewage treatment plants and collection systems. It actively promoted the concept that groundwater infiltration or stormwater inflow equated to unnecessary treatment expenses and needed to be greatly reduced or eliminated. As a result, it became a prerequisite for project funding.

To verify required leakage criteria compliance, municipalities relied on standard infiltration testing if the water table surrounding the installed sewer was high enough. Physical measurements of incoming water were taken using a V-notch weir. If the sewer was above the water table, an exfiltration test was used. This required filling the sewer and manholes with large volumes of water from an outside source and again physically measuring the pressure of water that would leave the tested sewer section.

POSITIVE AIR PRESSURE

In the 1960s, many prominent researchers including Roy Ramsier, William Chase, George Riek, Harvey Duff and others devised testing protocols that used compressed air. This research helped develop standard testing protocols by ASTM International and others and using air instead of water became the primary means of sewer line acceptance.

However, when it came to testing the various manhole

Manhole vacuum testing has undergone significant changes over the past five decades.

structures within the collection system, positive air testing had a drawback. With positive air pressure testing for pipelines, the system could be plugged off and properly restrained to resist the horizontal pipe movement the testing pressures exerted against the pipe (3-5 psi).¹ Restraining the vertical movement of the various manhole components proved problematic since low air pressures provided enough force to physically lift flattops, cone reducers or casting frames. Consequently, manhole leakage testing was limited to visual inspections or water infiltration and exfiltration testing.

NEGATIVE AIR PRESSURE

During the late 1980s, Peter Glazier of P.A. Glazier Inc. was the first to solve the positive pressure problem with manhole testing by using a vacuum, or negative pressure. Glazier proceeded to develop a simple portable testing apparatus, which could be used to seal the manhole top – whether it be a precast cone, flattop or even a casting frame – along with a portable, powered vacuum pump. He also hired a professional engineer, Michael J. Burke, to analyze the vacuum testing criteria and develop specific recommended testing vacuum limits and holding times related to current accepted positive air pressure testing methods. To gain wider acceptance of this novel testing approach, Glazier used Burke’s recommendations, but simplified the calculated holding times by promoting only a fixed value based on a manhole bury depth exceeding 30 feet.

A NEW STANDARD EMERGES

The acceptance of vacuum testing for manhole structures gained national

recognition, but without a national standard, the specific testing vacuum and holding times varied widely.² In many cases, unreasonable criteria led to “testing failures” for manhole structures, which were found to be in compliance with infiltration/exfiltration limits established by the sewer authority.

In late 1990, ASTM Subcommittee C13.06, Manholes and Specials, requested a consensus-based standard for vacuum testing manholes. After three years of research, committee discussions and ballot processing, the final criteria for testing went back to the original analysis developed by Burke, which used a variable holding time requirement based on the tested manhole interior diameter and depth. The committee also agreed to maintain the initial test vacuum at 10 inches of mercury, with an allowable drop to 9 inches within the allotted time restraint. In 1993, ASTM C1244, “Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test,” was published and Glazier’s original concept gained greater national acceptance.

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ASTM C13.06 is developing a new standard to address appropriate concrete manhole vacuum testing criteria.

ISSUES WITH BACKFILLED MANHOLES

But despite the new standard, an unexpected result occurred during the testing of manholes installed deep and backfilled in an area with a high water table. The combination of the manhole internal vacuum test pressure and the external hydrostatic pressure of the water table exerted pressures exceeding the limits on the resilient rubber connectors for the pipes

entering the manhole. Consequently, manholes without defects were not only failing the test, but had damaged connectors in difficult water conditions that needed repair.³

To alert the public about this issue, ASTM International – after a ballot process – revised the title and scope of C1244 to “Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill,” which was published in 2002. Though there are many valid technical reasons to revise this test, it did not answer the sewer agencies’ need to provide assurance that the completed manhole structure, including backfill placement, was in compliance to design requirements.⁴

In response to this need, ASTM C13.06 has a work item and task group in place to develop a new standard, which will address the appropriate concrete manhole vacuum testing criteria and issues of completed and backfilled manholes. If you are interested in participating and learning more about the ASTM task group or standards development, please contact Eric Carleton at ecarleton@precast.org or at (317) 208-6431. **PI**

Eric Carleton, P.E., is NPCA’s director of codes and standards. He also is an ASTM Award of Merit recipient and currently serves as vice-chairman of ASTM C13, Concrete Pipe.

RESOURCES:

- 1 Know When to Restrain Pipe, Michael Miller, MC Magazine, September/October 2004
- 2 Vacuum Testing Provides Simple Method of Demonstrating Manhole Quality, Michael Miller, MC Magazine, Summer 1998
- 3 Vacuum Testing Precast Concrete Manholes, Precast Solutions, Spring 2007
- 4 Vacuum Testing Backfilled Manholes, Claude Goguen, P.E., LEED AP, Precast Solutions, Spring 2011

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Taking Tool Safety in Hand

Recognizing the hazards associated with hand and power tools is key to worker safety at your precast plant.

By Evan Gurley

Tool use is unique to humans. In fact, anthropologists suggest that the use of tools is one of the characteristics that separates us from the rest of the animal kingdom.

The use of different power tools is common throughout manufacturing industries. These tools help workers perform tasks that would otherwise be difficult or impossible. But

tools can potentially be harmful and prompt accidents such as electrical shock, falls, cuts and burns. Workers can avoid these accidents through proper tool use, care, maintenance and a well-organized work area. Paying special attention to hand and power tool safety is necessary to reduce or eliminate these hazards.

Hand and power tool hazards are addressed in specific

Occupational Safety and Health Administration standards for general industry, shipyard employment, marine terminals, longshoring and the construction industry. General industry standard 1910 Subpart P, “Hand and Portable Powered Tools and Other Hand-Held Equipment,” governs manufacturing products in the precast concrete industry.

BASIC SAFETY RULES

According to OSHA, following five basic safety rules can prevent all hazards involved in the use of tools.

1. Keep all tools in good condition with proper storage and regular maintenance.
2. Use the right tool for the job.
3. Examine each tool for damage before use.
4. Operate according to the manufacturer's instructions.
5. Provide and use the proper protective equipment.

Employees and employers have a responsibility to work together to establish safe working procedures. If a hazardous situation is encountered, it should be reported immediately to the proper individual. Employees using tools must also be provided with any personal protective equipment necessary to protect them from hazards such as falling, flying, abrasive and splashing objects as well as harmful dusts, fumes, vapors or gases.

CLASSIFICATION OF POWER TOOLS

Power tools are classified by their power source. Categories include:

- Electric
- Pneumatic
- Fuel-powered
- Hydraulic
- Portable abrasive wheel
- Powder-actuated

Employees must be trained in the use of all power tools and should understand the associated potential hazards as well as the safety precautions required.

Electric tools

Employees using electric tools must be aware of several dangers, including electrical burns and shocks. To protect the user, electrical tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated or be powered by a low-voltage isolation transformer.

Tools with power cords must also be inspected frequently for cuts or damaged insulation.

When using electric tools, ensure they are:

- Operated within their design limitations.
- Stored in a dry place when not in use.
- Properly grounded and used with a ground fault circuit interrupter.
- Not used in damp or wet locations, unless given approval.
- Used in a manner where cords do not present a tripping hazard.
- Used in well-lighted work areas.
- Used with gloves and appropriate footwear.

Pneumatic tools

Pneumatic tools are powered by compressed air and include drills, hammers, sanders and chippers. There are several dangers associated

with the use of pneumatic tools, including the risk of being hit by an attachment or fastener. Eye protection is required, and head and face protection is recommended. Screens must also be set up to protect nearby workers from being struck by flying material. Noise is another hazard, but the effects can be reduced with hearing protection.

Fuel-powered tools

Fuel-powered tools are usually operated with gasoline. The most serious hazard associated with the use of fuel-powered tools comes from fuel vapors that can burn or explode and also emit dangerous exhaust fumes. Workers must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers. When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators must be used to avoid breathing carbon monoxide. Fire extinguishers must also be in the area.

Hydraulic power tools

The fluid used in hydraulic power tools must be fire-resistant and must keep its operating characteristics at the most extreme temperatures.



For more information about specific power tool safety procedures, visit precast.org/power-tool-safety or OSHA's website at osha.gov.

General Power Tool PRECAUTIONS

- **Ensure** the tool casing is not broken and no wiring is exposed.
- **Never** carry a tool by the cord or hose.
- **Never** yank the cord or the hose from the receptacle to disconnect.
- **Keep** cords and hoses away from heat, oil and sharp edges.
- **Disconnect** tools when not in use, before servicing and when changing accessories such as bits, cutters and blades.
- **Keep** all observers at a safe distance away from the work area.
- **Secure** work with clamps or a vise, freeing both hands to operate the tool.
- **Avoid** accidental starting. Do not hold a finger on the on/off switch while carrying a plugged-in tool.
- **Maintain** tools with care. Keep them sharp and clean and follow the instructions in the user's manual for lubricating and changing accessories.
- **Keep** good footing and maintain good balance.
- **Do not** wear loose clothing, ties or jewelry while using power tools.
- **Remove** all damaged portable power tools from use and tag them “Do Not Use.”



Photo provided by Palmaray Concrete Products

Store power tools in a dry location when they are not in use.

Employees must not exceed the manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters and other fittings. All jacks must have a stop indicator, and the stop limit must not be exceeded. The

manufacturer's load limit must be permanently marked in a prominent place on the jack, and must not be exceeded.

Safety devices

Two different kinds of safety devices are used with portable power tools – safety switches and guards.

Safety switch

Safety switches are designed to prevent an employee injury by automatically turning off equipment when an employee is not using the powered tool. The most common type of safety switch is a constant pressure switch. These switches are designed to shut off power to the tool when pressure on the switch is released. In addition, some tools may have a lock-on control, which can be turned off by a single motion.

Safety guard

Safety guards should be provided, as necessary, to protect the operator and others in the work area from rotating parts and flying material. Guards must never be removed or bypassed during operation. Portable circular saws with blades greater than 2 inches in diameter must be equipped with guards at all times. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work material.

Purposely removing a safety guard from a machine and

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failing to properly reattach it for operation is defined by OSHA as a “willful violation.” Penalties of up to \$70,000 may be proposed for each willful violation, with a minimum penalty of \$5,000.

EMPLOYEE TRAINING IS NECESSARY

Even the most elaborate safeguarding system cannot offer effective protection unless workers know how to use it and why. Specific and detailed training is thus a crucial part of any effort to safeguard against machine-related hazards. Safety training is necessary for new operators and maintenance or setup personnel when any new or altered safeguards are put in service or when workers are assigned a new machine or operation.

Ruben Gallegos, safety manager for Jensen Precast, explained just how effective his company’s power tool safety program has been.

“Through employee feedback and reporting, we have corrected conditions that could have led to a recordable injury,” he said. “Every employee in the company is empowered to look out for their safety and the safety of others.”

All tools are manufactured with safety in mind, but serious accidents often occur before steps are taken to search out and avoid or eliminate a tool-related hazard. Understand the hazards associated with hand and power tools and their injury prevention techniques to improve worker safety. **PI**

Evan Gurley is a technical services engineer with NPCA.



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Professor Deborah Chung's "smart concrete" offers a wide range of applications for precast manufacturers.

Photo provided by Deborah Chung

Concrete: EVOLVED

"Smart concrete" has the potential to revolutionize the precast industry.

By Debbie Sniderman

Nearly two decades ago, Deborah Chung, professor of mechanical and aerospace engineering at the University at Buffalo in New York, created smart concrete by adding carbon fiber admixtures to a standard concrete mix. Today, the material has evolved considerably, and is now on the cusp of becoming a major player in the world of concrete.

Structures built with smart concrete conduct electricity, altering conductivity and resistance values when deformed or damaged. They become more conductive when compressed and less conductive when tensioned.

In projects where the electrical or conductive properties of concrete are important, smart concrete is a great fit. For precasters, this equates to an opportunity for new business.

"Smart concrete widens the markets that precast manufacturers can participate in," Chung said. "It allows them to participate in industries they may not have dreamed about."

WELL-SUITED FOR PRECASTERS

According to Chung, using carbon fibers to make smart concrete could be likened to using an admixture, a side of the industry with which precasters are familiar. Unlike conventional

steel fibers, carbon fibers are microscopic. And because the fibers are so small, they clump. To help disperse the fibers, silica fume particles around 0.1 micrometer in diameter are added during mixing. Besides mechanically agitating the material to loosen the clumps, silica fume reduces the concrete's pore size so that less water can enter the structure.

Chung explained that, though corrosion is generally of higher concern with conductive materials due to increased electron movement, silica fume actually provides better corrosion protection and reduces shrinking during drying. Additionally, carbon fibers and silica fume work together to produce concrete that not only has electrical conductivity, but also strong structural performance. Carbon fibers also improve ductility, strength and modulus, particularly under flexure.

"For all of these reasons, it may even be more convenient to make carbon fiber concrete from precast than in the field," Chung said.

MAKING CONCRETE SMART

Although the cement used in smart concrete is the same as in conventional concrete, the mix designs are different. The electrical performance as well as mechanical properties must be kept in mind. Chung's lab used mostly Type I portland cement, but she said any type can be used. Early strength cement also produced similar results.

"The procedure to make smart concrete is not special," she said. "Dissolve a small amount of a water-soluble polymer in water, add carbon fibers, and then add that to the silica fume and cement. No special finishing is needed."

Material costs are about 30% higher than standard concrete. She recommends precasters start with applications that not only benefit from the improved mechanical properties, but require the extra functionality of the conductivity.

"A whole bridge doesn't need to be made of it, just certain regions," Chung said.

NEW MARKETS THAT COULD CHANGE THE PRECAST INDUSTRY

Smart concrete's electrical properties

make it an ideal sensor for stress, weight and vibration. The following are different applications where it could be successfully incorporated to increase safety, alert communities of potential infrastructure hazards and more.

PROTECTION FROM THE ELEMENTS

Conductive concrete may be required in tall buildings for lightning protection. It may help electrically ground buildings that currently rely on steel for grounding. It could also be used on roadways to prevent car accidents resulting from ice and snow, or on airport runways that need to be free of ice.

ELECTROMAGNETIC SHIELDING

Conductivity provides the electromagnetic shielding necessary to protect electrical components such as computers and transformers from radio frequency interference. Concrete with this shielding could be built into transformer vaults, under highways or in tall buildings that have their own transformers on various floors.

WEIGHT MONITORING

Smart concrete's electromechanical behavior allows it to be used for weighing purposes. Outdoors, sidewalks or pavers could detect people walking, which is helpful for security monitoring. In addition, transportation departments, highway builders and those who maintain traffic flow may wish to use the technology to monitor trucks while they are in motion.

Smart concrete floors that weigh people indoors could serve as room occupancy sensors to save energy by controlling heating, cooling, ventilation and lighting. They could also help monitor security – a building's weight could be zeroed when it is empty at night. Visitors or trespassers could then be detected when entering.

VIBRATION AND DAMAGE CONTROL

Critical structures that require monitoring for vibration control could use smart concrete to replace vibration sensors. Monitoring dynamic strains on bridges, high-rise buildings or other structures that are subject to strong forces such as wind and ocean waves

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“Smart concrete widens the markets that precast manufacturers can participate in. It allows them to participate in industries they may not have dreamed about.”

– Deborah Chung,
University at Buffalo

could make automatic active damping systems that suppress vibrations more effective.

Smart concrete also provides a non-destructive way to monitor damage. Instead of looking for cracks after they occur, smart concrete could send an alert before they are visible to the human eye or other sensors.

“Sensors attached to structures are fragile, fall off in a few years and need to be reattached,” Chung said. “Using the concrete as a sensor itself is inexpensive and durable compared to adding sensors. There is no loss of mechanical properties in the concrete.

“In fact, there can be a mechanical property gain from the carbon fibers.”

In architectural panels, where flexural properties are important, carbon fibers help improve strength so thinner, lighter slabs can be used.

“Thinner walls help in places where land is expensive, like in Japan where carbon fiber panels are currently used not so much to exploit their sensing properties, but for their mechanical gains,” Chung said.

WHAT COMES NEXT

Chung and her research group have proven the concept; created, optimized and tested prototypes;

collected data and performed lab testing. They monitored smart concrete’s sensing ability all the way to the end of fatigue life and found the electrical resistance change continued in every cycle until complete failure. The next step is field testing, and Chung wants to work with precasters to test preferred applications or help demonstrate the proof of concept.

“Although the electrical sensing functions haven’t yet been implemented, building and transportation industries have expressed interest in field tests,” she said. “The Smart Cities Initiative of the White House is expected to give additional impetus to this development.”

As our world becomes more connected, smart concrete has the potential to revolutionize the industry. Soon, sensing functions may be thought of as essential rather than as a “nice to have.” Should that occur, precasters will have the opportunity to shine, offering something that could impact many markets. **PI**

Debbie Sniderman is an engineer and CEO of VI Ventures LLC, an engineering consulting company.

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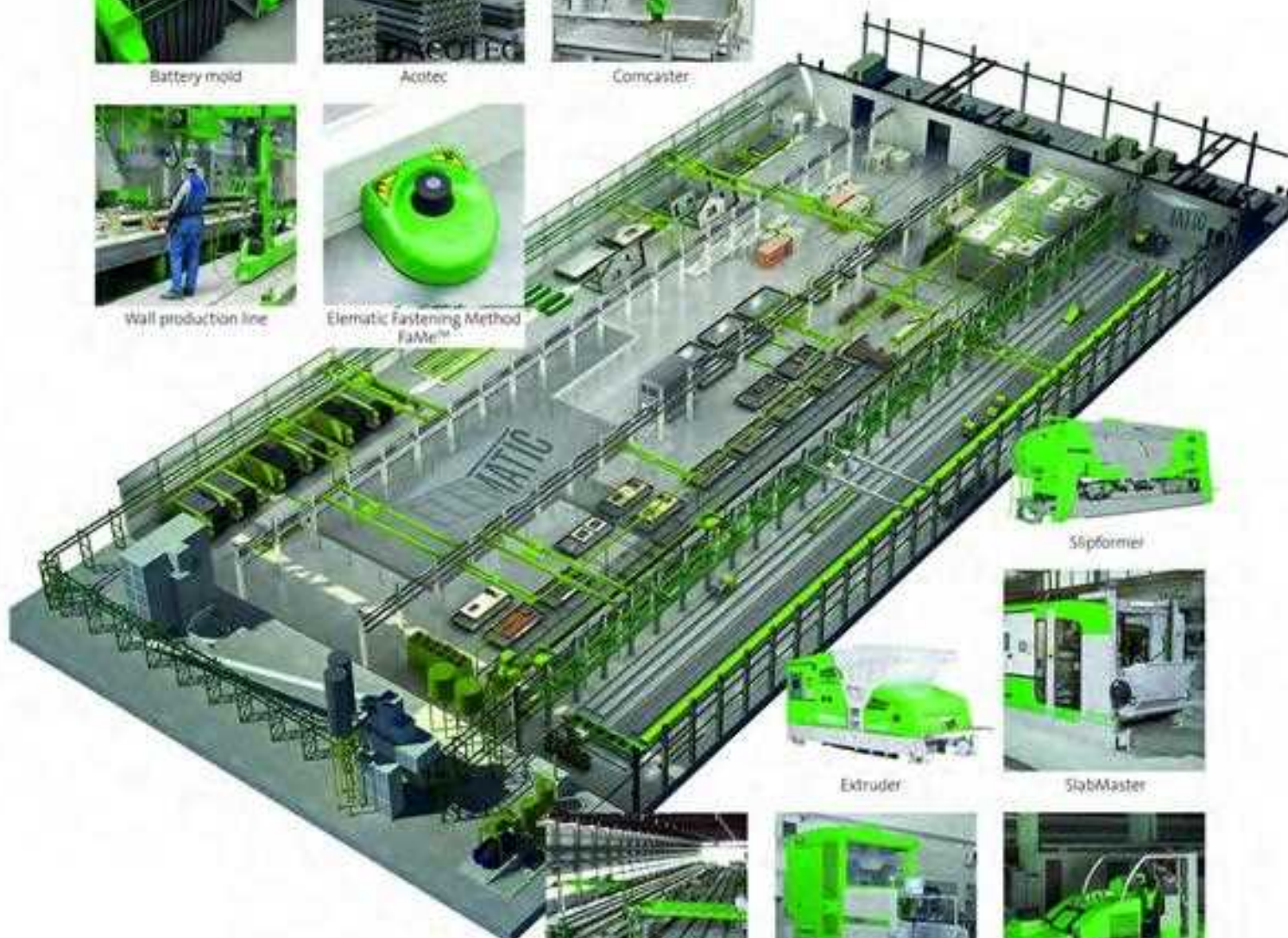
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Photo provided by Norwalk Concrete Industries

Bigger & Better

Expanding Your Precast Plant

Expecting the unexpected and crafting a **well-developed plan** are crucial to a **successful** plant expansion.

By Shari Held

Inspiration can come from many sources, from the whimsical to the philosophical. But when it comes to expanding a precast concrete facility or building a new plant, practicality and optimism rule.

“You can’t just erect a building because you want it,” said John Lendrum, president of Ohio-based Norwalk Concrete Industries. “You have to have a demonstrated need for it.”

In 2009, Norwalk Concrete first considered expanding, but

the recession put a halt to those plans. By September 2015, insufficient space and a “gut feeling” that added capacity would grow the business drove the company to reconsider. But the decision wasn’t finalized until the metrics justified the expense of adding 17,600 square feet to the existing facility.

“We also hoped to increase our operational efficiencies by being able to move like products together and lower our overall manufacturing costs,” Lendrum said.



Norwalk Concrete's expansion allowed for the addition of four overhead cranes, new coring machine capacity, new forming equipment and a solar energy field.

Increasing capacity to meet current market demand or to spur future growth – like the situation at Norwalk Concrete – is the common denominator in many plant expansions.

Crest Precast in LaCrescent, Minn., decided to increase its original plant by 14,500 square feet.

“The primary inspiration for us was we were passing on bidding work – even from repeat customers – to the tune of about 15% of annual volume,” said Steve Mader, president of Crest Precast.

A desire to increase production of its storm shelter and absorptive sound wall product lines ranked high on Crest Precast’s list of reasons to expand. There was also a safety issue.

“The space was quite cluttered and our production workers needed more room to walk around,” Mader said.

In Washington, a lack of space combined with increasing opportunities in the marketplace inspired Columbia Precast Products to build a new plant. In early 2017, the company will move from a 4-acre facility in Washougal to a 23.5-acre facility in Woodland.

“We need a lot of space to stage and stock our products because they take up a lot of real estate,”

said Ron Sparks, founder and general manager of Columbia Precast. The company typically stocks up to 8-foot-diameter manholes and retaining wall systems.

The new, 51,000-square-foot plant will give Columbia Precast ample space to install a dry cast system, which will increase production capabilities.

MORE THAN EXTRA SPACE

As part of its expansion, Norwalk Concrete also added four overhead cranes, new coring machine capacity, new forming equipment and a 135-kilowatt solar energy field.

“We added the solar field because we were able to show that economically, with the tax consequences, it just made sense,” said Lendrum, noting that green product lines make up an increasing portion of the company’s work.

The company hired a specialty contractor to install the solar energy field

“We’ve done a good job of thinking our way through the build and what we need and what we don’t need. I think it’s going to be a great opportunity for us.”

– Ron Sparks, *Columbia Precast*

and separated that out of the budget for the building envelope. Costs were reduced by casting the precast building panels and the foundation in house.

Crest Precast’s plant expansion design was based on its purchase of two used overhead cranes. The crane area is 42 feet tall and 65 feet wide, allowing workers plenty of room to operate.

“A modern precast plant needs a huge headroom,” Mader said. “All our buildings have at least 30 feet under the hook for handling products.”

Crest Precast also added an inside aggregate storage room. According to Mader, this will allow the company to expand volume during the winter. The company manufactured the precast insulated wall panels – used in the sidewalls – for the expansion.

“We have a nice, clean work environment that’s going to last a lot longer than a metal stud building,” Mader said.

Columbia Precast designed its plant with an outlook toward expanding production capacity and product lines. It can now manufacture up to 12-foot-diameter manholes, three-sided bridge units and retaining wall systems.

“Basically everything is on a bigger scale,” Sparks said. “The crane-way is wider and longer and we increased the weight capacity we can handle.

By moving to a new 51,000-square-foot plant in early 2017, Columbia Precast will significantly increase production capacity.



Those things don't sound that glamorous, but they really make a huge difference in our business. That's going to allow us to be really efficient."

In addition to two 20-ton cranes, two 10-ton cranes and a new batch plant, the new plant will feature a dry cast system that will enable Columbia Precast to cast and strip product every four minutes.

"In our case, it's probably going to increase our production capacity five times or more," Sparks said. "That's pretty significant. It will allow us to respond to demand in the marketplace."

Sparks estimates it will take two to three months to phase out production in the old plant while getting the new plant up to speed. The transition will take place in the winter – the slowest time of the year for Columbia Precast.

A LEARNING EXPERIENCE

Every project is different. No matter how many expansions you've got under your belt, surprises will arise. For Lendrum, it was regulatory hurdles and red tape related to the installation of the solar energy field.

"Getting that up and running put us about 120 days behind," he said.

For Mader, it was the cost of upgrading to 1,000-amp electrical service, which came in about 50% more than his original estimate. Sparks explained that being assertive on the front end

can be effective, as it may prevent a one- or two-week delay from evolving into a much larger problem.

Mader agreed.

"It took longer to build than we expected," he said. "We should have pushed the contractors a little harder."

RECOMMENDATIONS TO TAKE TO HEART

Each of these precasters has advice for fellow precasters considering expansion. Lendrum stressed the importance of planning.

"Plan how the disruption is going to impact your existing business," he said. "Driveways and production doors will be blocked. You have to give some thought to that."

Other planning challenges include deciding how to operate and train employees in the new facility and determining the optimal location for specific functions and equipment. Lendrum also suggests not putting all your dollars into the construction project. Instead, allocate part of the budget for unforeseen contingencies and costs not associated with the building envelope.

"And be sure to select a quality contractor who has demonstrated experience and proficiency in the type of structure you're building – especially with an expansion to an existing facility when you're trying to operate in it at the same time you're building," Lendrum said.

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Sparks believes a successful expansion starts with qualifying and hiring a good contractor and vendors.

“That doesn’t always mean going with the lowest cost,” he said. “Each vendor provides varying levels of assistance during the process. You have to compare apples to apples.”

Mader’s best advice: Build tall. He also endorses constructing a plant from precast.

“The taxman doesn’t charge you for height,” he said. “He only charges you for square footage. So build as high as possible. That will enable you to manufacture bigger products like box culverts, water storage tanks and electrical vaults.”

Crest Precast’s expanded facility contains indoor storage for aggregate, which will allow for more production volume in the winter.

WAS IT ALL WORTH IT?

The answer is a big “yes” from all three precasters. Production in Norwalk Concrete’s new facility began in March 2016. The company has also cut production hours for several product lines and added capacity with its new forming equipment.

“We are very excited to finally get this building in use. I’m positive we’re going to increase our sales by 20% in the next year because of the new floor space.”

– Steve Mader, Crest Precast

“We think we’ve made a big gain with the additional space,” Lendrum said. “It’s brought us some work that we wouldn’t have been able to do had we not expanded.”

The new Columbia Precast plant won’t be operational until early 2017, but construction is going well.

“I feel good about it,” Sparks said. “We’ve done a good job of thinking our way through the build and what we need and what we don’t need. I think it’s going to be a great opportunity for us.”

Crest Precast, which completed its expansion in July 2016, has already benefited from safer working

conditions and better material flow and workflow. The improved efficiencies have also allowed the company to shave production hours off several product lines. Mader anticipates the company will now be able to add more employees, cutting down on overtime hours.

“We are very excited to finally get this building in use,” he said. “I’m positive we’re going to increase our sales by 20% in the next year because of the new floor space. That’s fast. But this industry moves fast. That’s just the way it is.” **PI**

Shari Held is an Indianapolis, Ind.-based freelance writer who has covered the construction industry for more than 10 years.

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DRONES

Capturing a View from the Sky

Precasters use the power of **aerial drones** to **showcase** their work, locations and products in a **safe and confident** manner.

By Bridget McCrea

It's a bird! It's a plane! It's an ... unmanned aerial vehicle? And according to a new ruling, you'll need to follow FAA regulations and earn a pilot airman certificate if you'd like to use one for your precast concrete business.

In recent years, popularity of the devices more commonly known as drones has skyrocketed, with a recent report estimating that consumer sales are expected to increase tenfold by 2020.¹ While many of the drones in the air today are used for recreational purposes, the potential for commercial applications means more precasters are taking to the sky.

It's been about two years since Forterra Building Products started using unmanned, aerial drones to produce training videos for its different operational areas and visitor videos that offer a bird's-eye view of how those areas operate.

"It just doesn't look the same from the ground level," said Charles Piwowarski, area environmental manager for the Irving, Texas-based company.

More recently, Forterra began using drones to create videos that showcase the company's completed and in-progress projects. Piwowarski, who has been flying unmanned remote-controlled airplanes for about 20 years – long before the word "drone" was used in relation to recreational, unmanned aircraft – said they give precasters the opportunity to highlight projects and operations from an entirely new angle. And as long as drones are used in a safe, legal and responsible manner, they can be a great addition to a company's sales and marketing portfolio.

"Drone videos and photography provide a completely different perspective on the work and products that we produce," Piwowarski said. "A static photograph or even video that's shot from the ground just doesn't have the same impact that aerial photography does."

SETTING THE RULES

Defined by the Federal Aviation Administration as "an unmanned aircraft and the equipment necessary for the safe and efficient operation of that aircraft," drones include aircraft that are operated without direct human intervention. These flying devices have been getting a lot of attention lately – not all of it positive. One of the more highly publicized drone-related events involved a crash landing on the White House lawn. Additionally, the number of near collisions between these unmanned aircraft and commercial pilots has increased over the last few years.

In August 2016, the FAA released the first operational rules for routine commercial use of small, unmanned aircraft systems.² They are meant to quell the rising number of drone-related issues while also opening the door for responsible, trained individuals. The rules start the path toward fully integrating drones into the nation's airspace – a move that could help companies harness new innovations safely, spur job growth,

advance critical scientific research and even save lives.

According to Bloomberg, 3,300 people took the FAA's new commercial drone pilot test on the first day that it was available. Les Dorr, FAA spokesperson, said the rules spell out what drone operators need to do in order to legally

"We do flyovers of our projects from start to finish. We then take the footage and incorporate it into promotional videos that we post online and share with our existing and prospective customers."

– Eric Barger, C.R. Barger & Sons

operate the small, unmanned aircraft systems. One point to keep in mind, he said, is that drones still can't be operated directly over people unless the company obtains a waiver to do so.

"Now that the rules are in effect, companies have a reference point to look at and see what those rules cover and determine how the regulations impact the way they want to use the unmanned aircraft in the course of business," Dorr said.

According to industry estimates, the new FAA rule could generate more than \$82 billion for the U.S. economy and create more than 100,000 new jobs over the next 10 years. In effect since August 29, the new rule offers safety regulations for unmanned aircraft drones weighing less than 55 pounds that are conducting non-hobbyist operations.³ A few key points covered in the FAA's ruling include:

- **Minimizing risks** to other aircraft and people and property on the ground. The regulations require pilots to keep an unmanned aircraft within visual line of sight.
- **Allowing flights during daylight and during twilight** if the drone has anti-collision lights.
- **Addressing height and speed restrictions** and other operational limits, such as prohibiting flights over unprotected people on the ground that aren't directly participating in the unmanned aircraft system operation.



To learn more about the FAA's pilot airman certificate and commercial drone pilot test, visit [precast.org/dronecert](https://www.faa.gov/precast.org/dronecert).

C.R. Barger & Sons uses drone footage to help consumers, homeowners, business owners and developers better understand the company's product offerings.

Don't Let Your Investment FLY AWAY!

Drone flyaways are a hot topic on sites like YouTube, where you can watch dozens of videos of rogue drones with minds of their own flying off into the distance, crashing or otherwise going against their operators' wishes.

"Some people assume that because they can operate a video game that they can fly a drone, but a lot of drones are lost because of this mindset," warned Piwowarski.

According to Drone Enthusiast's "How To Avoid Crashes And Flyaways," the burgeoning industry is struggling to overcome the flyaway problem. Drone makers say their devices can zoom off or drift away with the wind for a variety of reasons, including software glitches, bad Global Positioning System data and lost connections to controllers. Many incidents end with the devices barreling into buildings, trees or bodies of water.

To stop errant machines, NASA recently created a tool that could help future pilots keep their drones nearby. It's a special box that plugs into the drone and brings it to the ground if needed. A virtual safety net, the Safeguard system allows users to set parameters for a drone. The machine then checks those parameters to make sure it's flying where it should be. If it ventures to the edge of the boundary, it's supposed to fly back. If it doesn't do that, the safety net sends the drone to the ground before it crosses into a "no fly zone," according to Popular Science.

Piwowarski said precasters who want to avoid losing their drone investments should start by learning how to fly the devices rather than just relying on the "smart mode" option.

"This option lets people who don't really know how to use a drone fly one, but that can be a problem," he said. "They start using them and don't even realize that, 'Hey, it just flew away.'"

One of the best ways to avoid the flyaway problem is by hiring a professional to show you how to use the drone, at least for its first use.

"If precasters want to use drones for all of their projects, it pays to get help up front and really learn how to do it right," said Piwowarski, who also advises companies to invest in a basic drone first. "Once you learn how to fly it and operate it safely, then spring for the more expensive one."

"They start using them and don't even realize that, 'Hey, it just flew away.'"

Dorr said precasters looking to capture video and images of plants should review the rules carefully and apply for any necessary waivers – namely, those that would allow the drone to fly over people. When applying for the waiver, Dorr said the precaster will have to "make the case that the operation can be done in a safe manner."

"If your plant is in an urban setting, you'll need to pay particular attention to this issue," he said.

SHOWING PROJECTS OFF FROM THE AIR

For C.R. Barger & Sons, in Lenoir City, Tenn., drones have become an important part of the project documentation process.

"We do flyovers of our projects from start to finish," said Eric Barger, president. "We then take the footage and incorporate it into promotional videos that we post online and share with our existing and prospective customers."

Barger said the company's drone has so far been "fairly easy" to use and operate. He said learning how to maintain safe distance from buildings and other obstacles is a necessity, as is understanding that the drones can be difficult to operate in certain conditions.

"It's best to fly them on nice, calm, clear days," he said, adding that precasters should also have an end game in mind before putting their drones up in the air. Knowing in advance how much footage you want or need, for example, helps prevent double work.

"In some cases, we'll fly it for 90 minutes over a completed project and then use just 30 seconds of that footage for the video," he said.

For example, Barger & Sons uses its drone to

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document its Stone Strong retaining wall work. These videos help consumers, homeowners, business owners and developers better understand the company's product offerings.

"These folks want to see videos and they want to see what your completed products and/or projects look like," Barger said. "One of the best ways to fulfill these needs is by investing in a drone and learning how to use it effectively."

He added that the actual drone flight is only half of the work. Once the footage is captured by and retrieved from the drone, you'll need editing software to turn the video into shorter, useable snippets. Barger suggests using iMovie for Mac or Windows Movie Maker.

"Those programs are made for beginners who don't have commercial video experience and they allow you to put everything together in a professional manner," he said.

Barger said the time and money his firm spends on obtaining and editing drone footage pays off when it comes time to show off its handiwork.

"Everyone likes to watch videos and to see how a project comes together from an angle other than on the ground," he said. "Aerial videos get everyone's attention and give them a better idea of what's going on with your product line." **PI**

Bridget McCrea is a freelance writer who covers manufacturing, industry and technology. She is a winner of the Florida Magazine Association's Gold Award for best trade-technical feature statewide.

RESOURCES:

- 1 yahoo.com/tech/popularity-drones-soar-heights-134224245.html
- 2 www.faa.gov/uas/media/Part_107_Summary.pdf
- 3 www.faa.gov/news/press_releases/news_story.cfm?newsId=20515

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Shea Concrete Products

Editor's Note: For our first-ever "Chairman's Choice" feature, we are proud to highlight two projects selected by Greg Stratis, president of Shea Concrete Products and newly elected NPCA Chairman of the Board. "Chairman's Choice" will be an annual feature of Precast Inc. magazine.

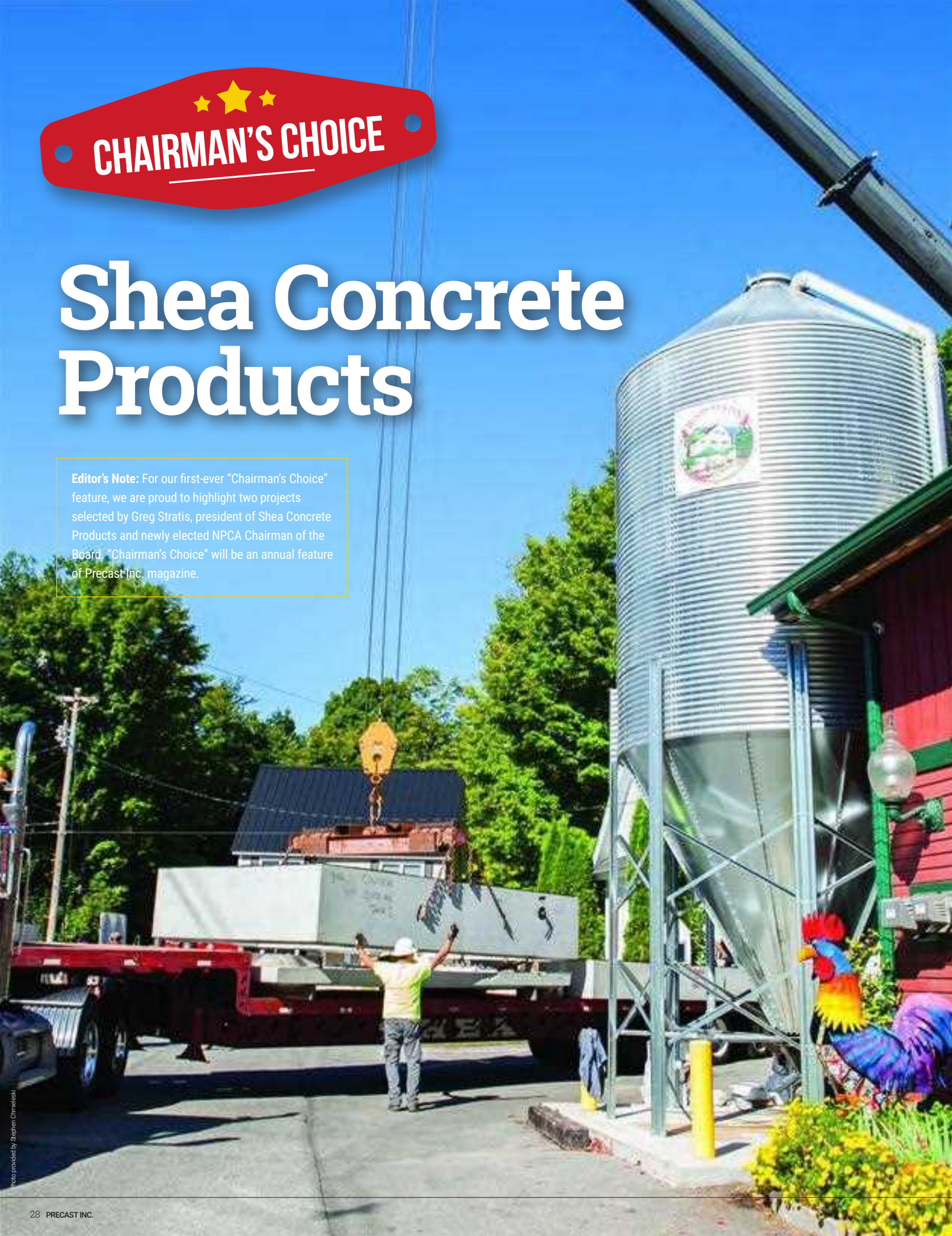


Photo provided by Stephen Cimaleski



Woodstock Inn Station and Brewery

North Woodstock, N.H.

CRAFT PRECAST

Water is an essential ingredient for brewing beer – on average, it takes 296 gallons of water to make one gallon of beer. With the use of such a large volume of water comes an equally large volume of wastewater, and often the need for a system that can handle the extra wastewater intake.

Such was the case with the Woodstock Inn Station and Brewery in North Woodstock, N.H. Thanks to a significant increase in size, the brewery now distributes products throughout the eastern United States, with future plans to deliver nationally. But the brewery's expansion caused its wastewater output to double, inundating the Woodstock Wastewater Treatment plant. The town had to remove the extra waste via trucks and started charging the brewery about \$8,000 a month for the associated fees. Desperate to find a solution, Scott Rice, brewery owner, contacted Septic Preservation Services. The company worked with Shea Concrete Products, headquartered in Wilmington, Mass., to design and manufacture a precast concrete wastewater treatment system to fix the problem.

A phenomenal solution

Jim Boucher, regional operations manager of Septic Preservation Services, said the company is often contacted to assist in emergency situations like this one.

"There are microbreweries popping up everywhere and many don't take into account wastewater," he said. "What happens is they start on a septic system, but in a short time kill it. It's becoming a big part of our business."

The company typically works with a local precaster to design a system that cleans up waste and establishes a particular waste strength level and pH level as designated by the city and state. For Woodstock Inn Station and Brewery, the solution was three 10,000-gallon precast tanks. The tanks store waste so bacteria can clean the water before it enters the wastewater treatment plant. According to Boucher, Shea Concrete helped design and build the custom tanks in a way that had never been done before.

"These tanks needed to be installed at different elevations, which is a very difficult thing to do and get done right," he said. "But Shea Concrete Products was able to cast the outlet elevations within the tanks so we could excavate a flat, large hole and place these all at the same level."



"I've never seen it done this way before and it worked out phenomenally. I don't think I'll do this any other way now."

Teamwork prevails

Jerry Mailloux, operations manager of Shea Concrete's plant in Nottingham, N.H., said the design department had limited information at the start, but worked closely with Boucher and the contractor, Rex Caulder of Caulder Construction LLC, to make the final plans for the system.

Manufacturing the precast products took less than two weeks. The tanks are 10 feet long, 17 feet wide and 12 feet high. They consist of 15 different pieces that needed to be modified for the project requirements.

Caulder was an existing customer and knew Shea Concrete could deliver all products on time, preventing unnecessary costs such as having the crane on site for an extended period. The project was completed within a week between the brewery's two busiest weekends – Labor Day and the start of the Highland Games at Loon Mountain Resort.

"Shea Concrete transported all the of the pieces to the site," Mailloux said. "The crane was ready at 8 a.m. and the last truck left at 11:30 a.m. with the tanks fully assembled. The trucks were staged at a New Hampshire Department of Transportation wayside area and were dispatched to the site as one was unloaded."

Caulder said Shea Concrete was a tremendous partner for the project.

"They were right there when they said they would be – no waiting," he said. "Precast concrete is the way to go. It takes up less room than a fiberglass tank and is easy and accessible for inspection."

Shea Concrete worked closely with Septic Preservation Services to develop a new approach for the design and installation of Woodstock Inn Station's precast tanks.

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1.5" - 2", 2.5" - 3", 3.5" - 4" &
5" - 5.5"



Mesh Chairs
1", 1.5", 2" & 3"



Stackable Bolsters
(44") 7/8", 1", 1.25", 1.5", 1.75",
2", 2.25", 2.5", 2.75" & 3"



Beam Bolster Uppers
(44") 1", 1.5", 2", 2.5" & 3"



X-Chairs
0.5", 0.75", 1", 1.5" & 2"



Pyramid Wire Clips
1", 1.5" & 2"

CHAIRMAN'S CHOICE



Photo provided by Stephen Cirmigliano

★ ★ ★
**Endicott
College**
Beverly, Mass.

PRECAST GOES TO COLLEGE

While many students at Endicott College in Beverly, Mass., enjoyed a relaxing vacation, local contractors completed a drainage upgrade for the campus before classes resumed in the fall.

Tim Wilson, estimator at Shea Concrete, said D&M Civil partnered with Shea Concrete based on price and availability. The stormwater system required 8-foot and 10-foot I.D. manholes for the 36-inch and 48-inch pipe

interconnections, which is unusual work for most precasters in the area.

“They were looking to get all of the structures on site within a couple of weeks,” Wilson said. “In a slow time of the year, that would not have been a problem, but the summer is very busy for us. We had to get the structures manufactured in a crowded schedule.”

Shea Concrete adjusted its production schedule to accommodate the project and

Despite a tight schedule, Shea Concrete was able to deliver and install the precast products for Endicott College on time.



Shea Concrete manufactured all of the custom precast manholes for the project in just 3 weeks.

delivered the precast products on time. Wilson said management is always looking for ways to improve standard product lines, and when jobs specify larger structures, they often fit the job requirements into products already in stock. But in some cases – like on this project – there is not enough room in the plant to pour large structures, requiring a custom build.

“From the beginning to the end of the project, in every phase of the project, Shea Concrete Products has done a great job.”

– Ralph Meola Jr., *D&M Civil*

“Typically, 5- and 6-foot diameter manhole material is in stock and we can just core holes in the structures, do a bunch and send them all at once,” he said. “But due to the large holes required, we had to pour them individually. They were also in a rush for them, so we had to get the submittals done and products shipped right away.”

All precast concrete products required for the project were manufactured within three weeks. The largest manhole structure was used for overflow and weighed more than 18 tons. Wilson said manufacturing went smoothly and the production staff stayed on schedule.

Ralph Meola Jr., director of operations at D&M Civil, said Shea Concrete will set structures when possible and that the two companies have a great relationship. For this project, a crane was on site to set the larger precast structures. Meola was very pleased with the project from start to finish.

““This particular job was very fast-paced,” he said. “From the beginning to the end of the project, in every phase of the project, Shea Concrete Products has done a great job. We’re working at speeds and a pace that you have to keep up with, so it’s a lot of work, and they are a great partner to work with.”

To learn more about Shea Concrete Products, visit sheaconcrete.com.

Sara Geer is NPCA’s internal communication and web manager, and is managing editor of Precast Inc.

RESOURCES:

1 huffingtonpost.com/2014/10/13/food-water-footprint_n_5952862.html

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This U.S. Coast Guard hangar in the Bahamas is constructed of precast concrete, allowing it to withstand Category 5 storms.

Photo provided by O'Brien Project

Build SMARTER

The case for resilient construction must include precast concrete.

By Claude Goguen, PE., LEED AP

Community, city, state and federal leaders in the United States are recognizing that building and re-building communities the same way every time is not effective. As a result, initiatives devoted to creating communities prepared for flooding, high winds, fire, and other natural and man-made disasters are popping up across the country. National Precast Concrete Association members must

also be prepared to service this growing segment of the precast concrete industry.

RESILIENCY DOESN'T NEED TO BE A FAIRY TALE

We all remember the story of the three little pigs. One pig built a straw house, the second built a stick house and the third built a precast concrete house (NPCA's version). Next, the big bad wolf huffs, puffs and blows down the straw and stick houses, but his powerful lungs are no match for precast concrete. Now, imagine if the first two pigs rebuilt their homes with straw and sticks again. Even in a fairy tale world, this would be illogical. But in the real world, this happens all the time. Strong storms and forest fires raze entire communities, and in the aftermath, we have historically rebuilt using the same materials and the same minimal building codes.

Resilience is defined as the ability to recover from or adjust to misfortune or change.¹ Misfortune seems to be on the rise in the U.S. and worldwide. In 2011 and 2012, the country endured a record number of extreme weather events – heat waves, droughts, hurricanes and floods – resulting in an estimated \$188 billion in total damages.²

Four out of five Americans live in counties that were hit by at least one federally declared weather-related disaster in the last



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Photo provided by Northeast Precast Company

Insulated, steel-reinforced precast walls held strong against Superstorm Sandy in Barnegat, N.J.

six years. Extreme weather is stressing the aging transportation, water, energy and communication infrastructure in our communities and regions, which was given a “D+” grade in 2013 by the American Society of Civil Engineers. This is forcing many community leaders to take action.

ACTIVE INITIATIVES

Resilient Communities for America

Resilient Communities for America has many mayors and leaders on board from across the U.S. who are devoted to creating more prepared communities.³ Resiliency strategies outlined in the Resilient Communities for America agreement include:

- **Evaluating local vulnerabilities** to extreme weather and a changing climate.
- **Reducing the community’s carbon footprint** to help reverse climate change and avoid the costs of adapting to more severe climate impacts.
- **Implementing energy efficiency programs** that help residents, businesses and municipal government save money and energy, lower carbon emissions and reduce demand on the grid during severe weather events.
- **Investing in upgrades to community facilities** to safely serve the needs of changing communities decades into the future.
- **Harnessing innovations in information technology and green infrastructure** to optimize performance and reduce costs through more efficient operation.

The use of precast concrete for building and infrastructure construction can contribute to achieving all these goals. Precast not only serves as protection from nature’s wrath, it is also the

premium choice for energy-efficient buildings, primarily due to its thermal mass.⁴

100 Resilient Cities

100 Resilient Cities is another organization raising awareness of the importance of resilience in the U.S. and worldwide.⁵ Some examples of city resiliency strategies include:

- **Toronto, Ont.:** Improvement of aging infrastructure.
- **Pittsburgh, Pa.:** Expansion of green infrastructure and improvement of the flood management system.
- **Norfolk, Va.:** Design and build-out of a new kind of coastal community to withstand changing threats.

Legislation has been introduced to provide incentives to builders and owners who use resilient construction methods. Congress bill H.R.3397, “Disaster Savings and Resilient Construction Act of 2015,” would, if passed, provide a tax credit to owners and/or contractors who use resilient construction techniques when building and renovating homes and commercial structures in federally declared disaster areas.

RESILIENT CONSTRUCTION IS EFFECTIVE

After Hurricane Andrew caused more than \$32 billion in damages in 1992, Florida adopted strict building codes for its coastal areas. Just three years after the new codes went into effect, they were tested when Hurricanes Charley, Frances, Ivan and Jeanne struck Florida within a six-week period. Post-hurricane analysis found that while Charley’s winds affected thousands of homes, not one of those designed and built under the new, strengthened construction rules suffered structural damage.⁶

The Insurance Institute for Business and Home Safety advocates for stronger construction in new and existing homes and has created a set of engineering and building standards called “FORTIFIED.”⁷ The use of precast concrete products in home and commercial construction can help meet these standards. This results in not only a safer home or business, but also significant savings in insurance.

Wildfires also pose a risk throughout the U.S. As more and more businesses expand into affected areas, wildfire risk will grow. Noncombustible siding materials such as precast concrete will provide the greatest protection from flames, embers and radiant heat.

PRECAST MEETS THE CHALLENGE

Significant challenges face communities wishing to improve their resilience to natural and man-made disasters. But the benefits are immeasurable. Precast concrete has a long service life and is robust and durable. It will withstand flooding, fires, high winds and hard rains. NPCA members must use resiliency as a part of their marketing message – especially in disaster-prone areas – so when the next big bad wolf comes calling, people and businesses can be safe.

For additional questions or comments, please contact Claude Goguen, director of sustainability and technical education, at cgoguen@precast.org or at (317) 582-2328.

Claude Goguen, P.E., LEED AP, is NPCA’s director of sustainability and technical education.

RESOURCES:

- 1 merriam-webster.com/dictionary/resilience
- 2 National Oceanic and Atmospheric Administration
- 3 resilientamerica.org
- 4 precast.org/2015/01/keeping-comfortable-precast-concrete
- 5 100resilientcities.org
- 6 resilientconstruction.org
- 7 disastersafety.org



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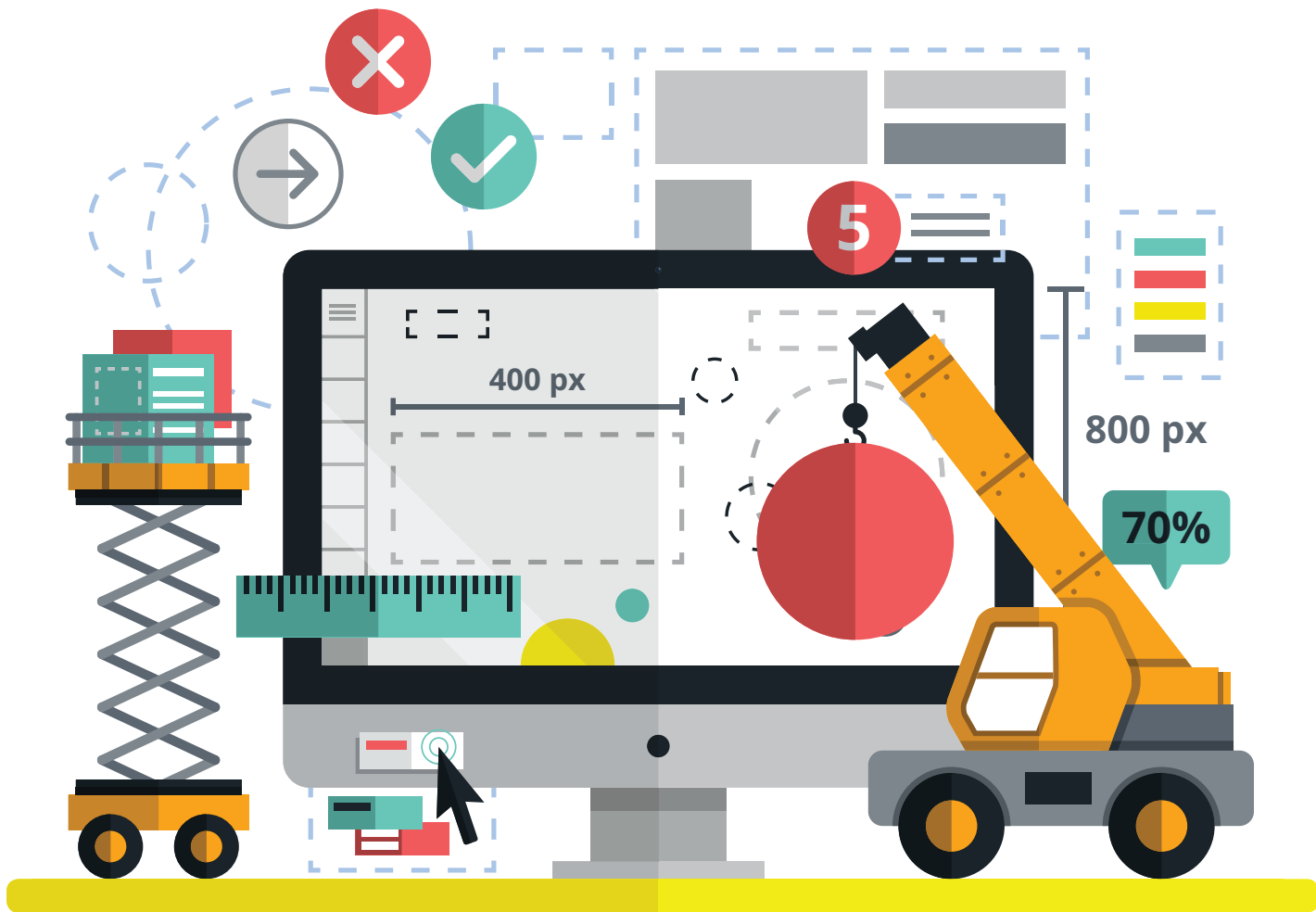
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Q&A: REDESIGNING YOUR WEBSITE

NPCA members highlight the importance of operating a **modern, ever-evolving** website.

By Mason Nichols

In the past five years, has your company changed? Perhaps you've hired a new plant manager who has drastically improved production processes in your plant. Maybe you've purchased a new piece of equipment that allows you to manufacture more product than ever before. Regardless of the area, you recognize that change is important. It's key to helping your business remain competitive in the precast concrete industry and helps ensure your continued success.

BUT WHAT ABOUT YOUR WEBSITE?

Your customers are relying more heavily on mobile devices each year, so the need for an updated website is paramount. Recognizing this, many NPCA members have recently upgraded their websites to propel their businesses forward and sell even more product.

We spoke with employees from Spillman Co., A.C. Miller Concrete Products, Easi-Set Worldwide and Shea Concrete Products to learn more about their websites, including the new features offered and ultimately, how the changes made will benefit each business.



Q: How do you use your website as a marketing tool for your business?

A: Our website highlights the three unique businesses that we operate: custom form manufacturing, resale products (plastics and magnets) and automated manufacturing solutions. We use monthly email newsletters to highlight a product and to drive customers to our website. Going forward, we plan to use the blog portion of the site to highlight certain projects. A database of previous project articles will be an asset to the sales team to lend credibility and show our capabilities.

Q: Why did you decide to redesign?

A: The website was last updated about six years ago and then “upgraded” about four years ago so it could be viewed on mobile devices. Navigation through the old site was cumbersome. The purpose of this redesign was to give us a fresh and relevant look along with better performance on mobile devices.

Q: What are the new features on your website that will have the greatest impact?

A: We’ve incorporated a first-generation online ordering feature for our standard plastic and magnet products. Orders can be placed through the website. Our in-house personnel then process and bill the order.

Q: What benefits have you already seen as a result of the redesign?

A: The layout is much better and easier to navigate. This upgrade also tied our blog to our website. Now all of our content – the blog, website and uploaded newsletters – is discoverable via search engines, making it easier to find our site.

Q: How do you see your website continuing to evolve in the future?

A: Future upgrades will further automate the online purchasing process. We will add new articles and blogs as we move forward. We hope our website will evolve into a tool our customers rely on to solve complex casting problems. Our hope is that the content we create on our website will be helpful to our industry and ultimately drive our business forward.

Answers provided by Don McNutt, president and chief operating officer.



Q: How do you use your website as a marketing tool for your business?

A: We use it for sales quotes, but beyond selling and marketing, it’s also an educational tool that shows the benefits of using precast concrete.

Q: Why did you decide to redesign?

A: It was time! We needed a fresh new look. We also wanted more capability to update our information more frequently.

Q: What are the new features on your website that will have the greatest impact?

A: A quote request template, enhanced product section, payment portal, easier navigation and an adaptive design, which allows our website to work on a range of screen sizes.

Q: What benefits have you already seen as a result of the redesign?

A: We have seen an increased sales quote volume as well as an overall enthusiastic response to the new design.

Q: How do you see your website continuing to evolve in the future?

A: A website is like a living organism. You have to keep nurturing it or it will die. We will continue to update and modify the site to keep it relevant and to keep our audience engaged.

Answers provided by: Ramzi Kavar, executive vice president; Dave Gautreau, sales manager; Sharon Philippe, marketing manager.

Q: How do you use your website as a marketing tool for your business?

A: Easi-Set deploys multiple websites that speak specifically to the needs of our diverse customer base, offering details and specifications and showing examples of our work. The corporate website, easiset.com, explains in detail the benefits of our proprietary precast product licensing program, which is aimed at precasters looking to expand their product lines. Each of the five additional product websites go into the specific details and benefits



Your customers are relying more heavily on **mobile devices** each year, so the need for an **updated website** is paramount.



geared toward the end user of that product.

Q: Why did you decide to redesign?

A: The main reason for updating to a responsive design was to comply with the new rules set forth by Google to provide a greater customer experience for mobile and tablet devices. We had already upgraded the sites to a content management system in the past five years, which gave us greater in-house control of process and ability to make changes and add content.

Q: What are the new features on your website that will have the greatest impact?

A: Responsive technology for optimal viewing on any device, cleaner coding for faster download times, an improved content management system that cuts down on time spent updating the site, a floating right-hand column quote request form which has improved our response rate, and larger project and photo galleries.

Q: What benefits have you already seen as a result of the redesign?

A: More traffic and quote requests. The newest content management system has given us a greater ability to make the majority of content changes and additions in-house as

opposed to paying our outside web development firm.

Q: How do you see your website continuing to evolve in the future?

A: We continue to tweak coding and technical issues to have the sites perform as optimally as possible. The main goal moving forward is to add to and change the content on the sites. Google wants to see relevance in your content, and that your website is renewed and refreshed on a regular basis. Gone are the days of just having a good website being enough. It is now a constant evolving machine that you must consistently feed and improve if you want to stay ranked on the first page of search results. We also highly value any comments or suggestions our customers make about the sites, and make changes where appropriate to meet their needs.

Additional websites: easisetbuildings.com, slenderwall.com, jjhooks.com, softsoundwall.com, beachprisms.com

Answers provided by Arthur Miles, president.

SHEA CONCRETE PRODUCTS sheaconcrete.com

Q: How do you use your website as a marketing tool for your business?

A: Our site is a tool for three different groups of people: engineers (specifiers), contractors and homeowners. Engineers can download drawings and get information on using precast products. Contractors can get quotes and view PDF drawings of all our products. Homeowners are primarily interested in our concrete steps and get all kinds of information on size, styles and installation. We also have links to photos and videos to help provide additional information.



Q: Why did you decide to redesign?

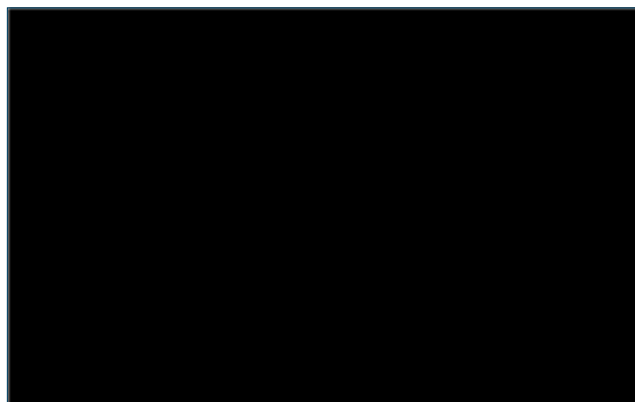
A: We feel that every 5 years or so, you should refresh your website to keep people interested. Updating your site also helps with rankings in search engines such as Google. We also need to keep up with ever-changing technology. The site needed to be responsive for smartphones, tablets and other electronic devices.

Q: What are the new features on your website that will have the greatest impact?

A: More photos and videos, an updated catalog view, responsiveness to any screen size and enhanced search engine optimization.

Q: What benefits have you already seen as a result of the redesign?

A: The website just recently went live. We are hoping to get a better response organically in search engines and be more user friendly (fewer clicks) for customers coming to our site. When people come to our site, I want them to feel that we are a modern company with a personal family image and a wow factor. We have already heard positive feedback from customers.



Q: How do you see your website continuing to evolve in the future?

A: Many people – myself included – do a lot of research online and want answers to questions after normal business hours. I hope our website can be a tool for doing this. Then, during regular hours, we can follow up with a personalized email and phone call. I am amazed how many inquiries we get from the website from 5 p.m. to midnight from engineers, contractors and homeowners.

Answers provided by Greg Stratis, president. PI

Mason Nichols is the managing editor of Precast Solutions magazine and is NPCA's external communication and marketing manager.

RESOURCES:

¹ searchengineland.com/its-official-google-says-more-searches-now-on-mobile-than-on-desktop-220369

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NPCA Quality Control Manual: What's New?



Clarification on changes to the NPCA Quality Control Manual for 2017.

NPCA Staff Report

Each year, the NPCA Quality Assurance Committee looks to both members and specifiers to determine ways to improve the NPCA Plant Certification Program. The 12th Edition of the NPCA Quality Control Manual for program year 2017 includes a number of changes, additions and several updates, along with editorial changes that reflect this effort.

The following sections of the manual have been changed:

- **4.5 Concrete Curing** – Completely rewritten and commentary expanded
- **6.3.3.1 Absorption Testing** – Now a critical requirement under “Round Manhole Requirements”
- **6.4.1 Absorption Testing** – Now a critical requirement under “Box Culvert Requirements”
- **6.5 Septic Tank Requirements**
- **6.6 Grease Interceptor Requirements** – New section
- **Plant Terms and Conditions** – New section added under 7.2.13.4

These changes ensure the highest quality manufacturing processes from NPCA certified plants and provide assurance to customers regarding quality.

“The NPCA certified plant program is constantly evolving while maintaining a direct focus on continuous improvement for our industry as a whole,” said Frank Bowen, plant manager of Piedmont Precast and chair of the NPCA Quality Assurance Committee. “Now ANSI certified, our program has made significant improvements that promote NPCA certified plants to a greater spectrum of clients with special interest to regional specifiers and state DOTs. We want to make the audit process simple, yet conclusive.

“Any new policy introduced or any improvements made to the Quality Control Manual are crafted or edited with efficiency and accountability in mind for the plants and clients who take advantage of our certified program.”

One of the many benefits of a strong and continuously improving program is the involvement of specifiers and the resulting reliance on the program, which includes 41 state DOTs and many other entities that require NPCA certification.

“The willingness to evolve and continue making necessary changes defines NPCA as a first-class organization,” said Jason Tucker, P.E., TxDOT, and a member of the NPCA Quality Assurance Committee. “The hard-working and dedicated committee, which is responsible for many of the changes to the ever-evolving NPCA Quality Control Manual, is a testament to this. Anyone who wants to help make a difference, I encourage you to join one of the many NPCA committees.”

“The willingness to evolve and continue making necessary changes defines NPCA as a first-class organization.”

– Jason Tucker, P.E., TxDOT

For a complete list of changes or to download the most up-to-date NPCA Quality Control Manual for Precast Concrete Plants, visit precast.org/qcmanual.

If you have questions, contact Phil Cutler, NPCA’s director of quality assurance programs, at pcutler@precast.org or (317) 571-9500. **PI**



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From left: David Feuerstein, Leo Feuerstein, Richard Alvarado and Jorge Rodriguez

Tenacity:

WESTERN PRECAST CONCRETE

Hard work, dedication to education and the **Master Precaster program** create the perfect storm for **success** at Western Precast Concrete.

By Mason Nichols

To run a precast concrete business, a few integral components are required.

At a basic level, you'll need a piece of land, a production facility and the equipment and materials necessary to batch, mix and pour your products. You'll also need employees and a management team to oversee daily operations. Add in sales, marketing and a website, and you'll have the core elements in place.

Running a successful precast concrete business is an entirely different story.

For 70 years, Western Precast Concrete (originally Western Concrete Works) has been a fixture in El Paso, Texas. The company's long-standing success is the result of the hard work and tenacity of the Feuerstein family, who overcame hardships – including the sudden loss of founder Robert (Bob) Feuerstein in 1971 – to sustain a thriving business. Bob's sons, Leo and David, carry on their father's legacy today by running the business with the same passion and fervor he possessed.

But the brothers don't stop there. Their commitment to advancing employees through education and NPCA's Master

Precaster program has played a crucial role in helping ensure continued success. The company has four Master Precasters – Richard Alvarado, Jorge Rodriguez, and Leo and David – currently in the plant. A fifth recently retired and two more are currently in the program. And Leo believes all of them are essential to operations.

“The education received through the Master Precaster program is important,” he said. “I’m not sure how you could produce quality precast without an educated staff.”

RICHARD ALVARADO

More than a decade ago, Richard Alvarado was pursuing a career in law enforcement. But the 5-year veteran of the U.S. Army was also playing a waiting game before the police academy would begin. While seeking part-time work in the interim, he secured a position at Western Precast.

Today, Alvarado serves as Western Precast’s general manager. He also recently began a term on the NPCA Board of Directors. According to Alvarado, the Master Precaster program has been key to his career advancement.

“The real moment of clarity for me came during the management class (Production and Quality School III – Leadership),” he said. “I’ve grown exponentially in the field of personnel management after that course. The concept that not every employee interaction can be handled in the same manner finally sunk in after participating in that course.”

Even though he already earned his gold hardhat, symbolizing his designation as a Master Precaster, Alvarado remains dedicated to learning, a trait that can be found everywhere you look at Western Precast.

“My methods of challenging myself have not changed since I started in the industry,” he said. “I try to learn one new concept, idea, product type or technology a month.”

JORGE RODRIGUEZ

Production Manager Jorge Rodriguez has come a long way since starting at Western Precast as part of a work study program in 1984. His penchant for hard work and desire to know more have earned him ever-expanding responsibilities and the Master Precaster designation.

Rodriguez became interested in the Master Precaster program when NPCA offered it for the first time. Because of his role as production manager, he immediately recognized the value of keeping up with changes in the industry.

“Becoming a Master Precaster has improved my ways of verifying many QC-related items such as placement of steel and form inspections,” Rodriguez said. “I also have a better understanding of proper stripping and handling for shipping of product and even the importance of good housekeeping at the plant.”

Just as many other graduates have reminisced, Rodriguez was struck by the words of instructor Greg Chase, who says during one of his courses, “If you always do what you’ve always done, you’ll always get what you’ve always got.”

Keeping those words in mind, Rodriguez continues to improve his skills today by learning to use new forms and products and taking part in more training.



LEO AND DAVID FEUERSTEIN

Brothers Leo and David both recognize how much Western Precast benefits if the company is committed to education. After seeing Mike Loy of Bethlehem Precast in Bethlehem, Penn., earn the first-ever gold hardhat in 2012, both knew their company should get involved in the Master Precaster program right away.

“When Mike was introduced as the very first Master Precaster, I thought, ‘That makes sense for every precaster,’” David said. “Anybody getting their hands dirty with concrete should learn all of the

Richard, Jorge, Leo and David graduated from the Master Precaster program at The Precast Show 2014 in Houston.

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intricacies of pouring concrete and making a better product.”

Leading by example, Leo and David both enrolled in the program, inviting others in the plant to do so as well. Just two years later, at The Precast Show 2014 in Houston, they graduated

along with Alvarado, Rodríguez and John Franklin, who is now retired.

Leo said earning the Master Precaster designation is beneficial whether you’re new to the industry or a seasoned veteran.

“Evolving in any profession is all about education,” he said. “Becoming a Master Precaster allowed me to hone my skills and refresh my technical knowledge.”

David agreed, noting that the skills gained can also be passed on to new

employees, creating a culture where everyone benefits.

Both Leo and David referred to the exceptional instructors in the program as critical to their experience, citing Claude Goguen of NPCA as particularly helpful. Leo noted that Goguen worked hand-in-hand with each student to ensure everyone understood the course material of PQS II – Technical, which Leo recalls as the most difficult class he took.

David echoed Leo.

“Claude was able to take someone who doesn’t have basic math

skills and teach them everything that they need to learn in a very pleasant, fun atmosphere,” he said. “You didn’t have to be a college graduate to get into this and understand what was going on.”

Thanks to both their own experiences and that of their employees, Leo and David continue to encourage others at Western Precast to enroll in the Master Precaster program. Two more workers, Bailey Feuerstein O’Leary and Daniel Quezada, are currently working toward earning their own gold hardhats.

A SENSE OF PRIDE

For Western Precast, being successful isn’t just about manufacturing top-notch precast, though that’s certainly an important part of the equation. It’s also about establishing a culture where employees can be truly proud of the work they perform.

“I see the staff members who have attained this designation carry a sense of pride in their daily activities,” Leo said.

With a commitment to their employees and plenty of their father’s work ethic to spare, the Feuerstein brothers have established a workplace that is as knowledgeable as it is successful. Leo and David wouldn’t have it any other way. **PI**

Mason Nichols is the managing editor of Precast Solutions magazine and is NPCA’s external communication and marketing manager.

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DETAIL A
SCALE 1 : 20

NPCA 51st Annual Convention Wrap Up

NPCA Staff Report

NPCA's 51st Annual Convention, held in Austin, Texas, drew 405 members – the third largest in NPCA's history.



Everything's big in Texas, including NPCA's 51st Annual Convention. The third largest Convention in NPCA's history drew 405 members to the Renaissance Austin Hotel in Austin, Texas, for Precast Marketplace exhibits, the Annual Business Meeting, committee meetings, NPCA's leadership awards, educational sessions and a host of other activities.

Greg Stratis, president of Shea Concrete Products headquartered in Wilmington, Mass., was elected NPCA's 51st chairman of the Board of Directors at the Annual Business Meeting on Oct. 1. In his acceptance speech, Stratis spoke of his experiences in the industry and the association, future initiatives and how the association is dedicated to addressing all member challenges in the coming year.

"We all know it is a challenging time to be a precaster," he said. "But for every new challenge there are new opportunities,

and the Board, committees and staff are all committed to helping our members take advantage of them. I'm excited to get started and I'm looking forward to the next 12 months."

In addition, the presentation of the Robert E. Yoakum Award highlighted the Leadership Luncheon on Oct 1. One of the precast industry's longest running and most prestigious honors, the 2016 Yoakum Award went to Mark Thompson, vice president of Jefferson Concrete Corp. in Watertown, N.Y. Thompson has been deeply involved in NPCA since 1996. He accepted the award to a standing ovation.

"There are an awful lot of winners of this award that have done an awful lot for this organization, and it's pretty humbling to become one," Thompson said. "If you know me well, there's nothing more important in life than family and friends. I'm proud to say my best friends are people in this organization and I so appreciate this award."

Sam Lines, engineering manager for Concrete Sealants in Tipp City, Ohio, received NPCA's top membership honor, the Douglas G. Hoskin Award.

Members also attended plant tours to three precast concrete operations and raised money for NPCA Foundation scholarships and outreach programs by participating in the 6th Annual Silent Auction and the Casino Night Fundraiser.

New officers and additional award recipients from the NPCA 51st Annual Convention include:

2017 OFFICERS

Chairman of the Board

Greg Stratis, *Shea Concrete Products*

Chairman-Elect

Ashley Smith, *Smith-Midland Corp.*

Secretary/Treasurer

Michael Hoffman, *Lindsay Precast*

NEW BOARD MEMBERS

Directors – 3-Year Term

Richard Alvarado, *Western Precast Concrete*

Jonathan Ohmes, *Champion Precast*

Philip Shoults, *Oldcastle Precast*

Ron Sparks, *Columbia Precast Products*

Associate Member – 3-Year Term

Ray Clark, *US Formliner*

AWARDS

Robert E. Yoakum Award

Mark Thompson, *Jefferson Concrete Corp.*

Douglas G. Hoskin Award

Sam Lines, *Concrete Sealants*

Committee Chair Service Awards

Richard Alvarado, *Western Precast Concrete*

Chris Fitzpatrick, *Oldcastle Precast*

Aaron Ausen, *Dalmaray Concrete Products*

Lisa Roache, *Gainey's Concrete Products*

Dominic Girotti, *Hy-Grade Precast Concrete*

Board of Directors Service Awards

Jennifer Burkhart, *Arrow Concrete Products*

Leo Feuerstein, *Western Precast Concrete*

Scott Hayward, *Oldcastle Precast*

Greg Roache, *Gainey's Concrete Products*

Michael Tidwell, *Bartow Precast*

Keith Womack, *J-K Polysource*

Foundation Service Award

Barry Fleck, *A.L. Patterson*

Scott Hayward, *Oldcastle Precast*

TOP GUN AWARDS

Top Gun Level

Pat Liston, *Forterra Pipe & Precast*

First Merit

Michael Hoffman, *Lindsay Precast*

Second Merit

Michael Tidwell, *Bartow Precast*

Third Merit

Brent Dezimmer, *StructureCast*

Sam Lines, *Concrete Sealants*

Kirby O'Malley, *Garden State Precast*

Ashley Smith, *Smith-Midland Corp.*

Presidential Level

Leo Feuerstein, *Western Precast Concrete*

Andy Wieser, *Wieser Concrete Products*

PI



Chuck Babbert (left), the 2015 Robert E. Yoakum Award winner, presented the 2016 award to Mark Thompson, vice president of Jefferson Concrete Products.



Sam Lines, Concrete Sealants (right), receives the Douglas G. Hoskin Award from NPCA Chairman Andy Wieser, Wieser Concrete Products.

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People & Products

People & Products is a forum where NPCA members and nonprofit organizations can share information on new products, personnel promotions, acquisitions or service announcements concerning the precast concrete industry. Items are printed on a space-available basis.

For possible inclusion, send your press releases and photos to sgeer@precast.org.

SICOMA MIXERS SOON TO BE MANUFACTURED IN THE U.S.

SICOMA North America currently manufactures mixers sold into the North American market from its factory in Perugia, Italy. In the near future, the company plans to begin producing mixers from its facility in the U.S. near Tampa, Fla. For more information, visit sicoma.biz.



TIM FRAKES JOINS CONAC AS REGIONAL SALES MANAGER

Tim Frakes has joined CONAC as the new regional sales manager for the company's Midwestern territory. Before joining CONAC, Tim held several positions in sales at Kerkstra Precast and most recently worked at Meadow Burke, where he served as a district sales manager in the company's precast division.

Tim can be reached at (616) 312-4162 or by email at tfrakes@conacweb.com.



Tim Frakes

SMITH-MIDLAND OPENS PRECAST PLANT IN SOUTH CAROLINA

Smith-Midland Corp., headquartered in Midland, Va., opened a precast concrete manufacturing facility in Columbia, S.C. The newly formed subsidiary will be known as Smith-Columbia.



Aerial view of Smith-Columbia's 39-acre precast production facility in Hopkins, S.C.

According to Rodney Smith, chairman and CEO of Smith-Midland, the new facility consists of 39 acres and approximately 40,000 square feet of production and office space. Smith-Columbia will service the Atlanta metropolitan area and approximately 10 military bases in South Carolina and Georgia.

FORSYTH CAPITAL INVESTORS ACQUIRES HAWKEYEPEDERSHAAB

HawkeyePedershaab, Inc. has been sold to investment firm Forsyth Capital Investors, LLC.

"The Forsyth Capital team brings a wealth of relevant operational expertise and value-creating strategies to our company, giving us tremendous confidence that we can further enhance our existing business and accelerate the growth of our global platform in the years to come," said Vern Cameron, CEO of HawkeyePedershaab.

The company will continue to operate from its Mediapolis, Iowa, and Brønderslev, Denmark, facilities. **PI**

OSHA Rule to Require Precasters to Submit Injury Data Electronically

NPCA Staff Report

Recent revisions to OSHA's recordkeeping regulation will result in a host of changes for employers in the precast concrete industry. Under the revised regulation, some employers will be required to submit certain injury and illness data to OSHA electronically.

OSHA also included provisions that prohibit employers from retaliating against employees who report injuries. The provisions have significant implications for post-accident drug testing and safety incentive programs.

The final rule requires employers to record work-related illness and injury data on an OSHA 300 form and OSHA 301 form, "Injury and Illness Report," as well as a summary of all data on an OSHA 300A form placed visibly in the workplace. Employers must also file each form electronically. OSHA intends to make the data publicly available online, with names of the injured persons deleted. In addition, amendments to the rule require employers to:

- **Inform employees** of their right to report free from retaliation.
- **Clarify that an employer's procedure** for reporting must be reasonable and cannot deter or discourage employees from reporting injuries and illnesses.
- **Incorporate the existing statutory prohibition** against employees for reporting work-related injuries and illnesses.

OSHA published its final rule on May 11, 2016, and the reporting requirement will be phased in over two years. Most precast plants fall into the category of employing 20 to 249 workers in a plant. Precast plants are considered high risk workplaces, which means that you must begin submitting data electronically from your OSHA 300A form once per year, with the first two submissions due July 1, 2017, and July 1, 2018. Beginning in 2019, the data will be due each year on March 2. The rule is slightly different for establishments with 250 or more employees.

NPCA hosted a webinar on Aug. 17, 2016, titled, "OSHA Electronic Recordkeeping Regulation and Retaliation," which is now available for free on our online learning center.¹ We will continue to educate the industry on this ruling by providing the training and tools needed to help the precast concrete industry stay informed. For reference, we created a fact sheet that outlines the final rule requirements and dates for form submissions.¹

We have also aligned with the National Association of Manufacturers, the largest manufacturing association in the United States, and the Manufacturer's Center for Legal Action, the leading voice of manufacturers in the courts. The MCLA strategically engages in litigation as a direct party, intervenes in litigation important to manufacturers and weighs in as amicus curiae on important cases.

Together, we are challenging the OSHA rule and taking legal action fighting against these revisions in the courts.

For more information on OSHA's final rule, please contact Evan Gurley, technical services engineer, at egurley@precast.org or (317) 582-2329. **PI**

RESOURCE:

¹ precast.org/osha



In addition to the electronic reporting requirements, the OSHA rule includes **anti-retaliation provisions** that were originally scheduled to be implemented Aug. 10 but have been delayed twice in the face of opposition from construction industry groups. **The new enforcement date is Dec. 1, 2016.**

Visit precast.org/osha to learn more about these important provisions and how they relate to your safety policies and post-accident drug testing.

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THE PRECAST SHOW 2018
 Colorado Convention Center and
 Hyatt Regency Denver
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 Omni Providence Hotel
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