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*NPCA is a trade association representing the manufacturers of plant-produced concrete products and the suppliers to the industry around the world.*

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# Three Generations Strong



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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](http://precast.org/technical-services).

Vijay writes

**I am making vertical cast concrete pipe with zero-slump concrete with a 0.39 water-cement ratio. All is good, but bug holes are present on the surface. Please inform me how to remove bug holes from the pipe surface.**

**NPCA Technical Services engineers answered:**

You did not mention if your pipe process was using packerhead consolidation or standard dry cast with external vibration (either attached to the formwork, vibrating core or both). Regardless, when casting a zero-slump concrete as you describe, the internal friction within the cement paste and fine aggregate is greater than normal-slump concrete. Consequently, when entrapped air is pressed against the form, many times the paste and fines do not move to fill the void with the given vibration energy. The following are some items that should be checked.

Ensure all the vibrators are functioning correctly. Sometimes, among the noise and commotion of pipe production, a vibrator

may stop working. This is difficult to identify without checking.

Ensure the vibrator chosen for this product is adequate for the formwork. You may need to request assistance from your vibrator supplier to ensure the frequency and amplitude of the external vibrator is appropriate for the placement and product being cast.

If the pipe is being consolidated on a vibrating table that worked well for a smaller diameter pipe, it may not work well for a larger size due to the increased weight of the product and energy increase required to properly reach and consolidate all the areas.

For packerhead production, you may experiment to see if reducing the speed rate of the packerhead or if two passes of the roller head will greatly decrease the bug holes on the exterior surface. Additionally, check if the distribution fins at the top of the packerhead are functioning properly.

For both production methods, the easiest solution is to slow down the rate of concrete entering the form. Give the vibration or packerhead time to consolidate the mix. For dry-cast forms, it is good practice to load the form uniformly and continuously along the perimeter – described as ribbons or layers of concrete – rather than in larger pockets moved intermittently along the form, which can trap substantial amounts of air in the mix.

Lastly, some precasters find the addition of a liquid surfactant admixture provides an enhanced surface texture, reducing internal friction of the concrete components and increasing movement into trapped air voids. It also

provides a slick surface, which the form can trowel as it is stripped from the product to remove smaller bug holes. Experimenting to provide the correct amount is critical, as too much will create entrapped bubbles.

Olevis writes:

**Can you splice epoxy-coated steel with non-epoxy-coated steel? I'm wondering if this could cause a cathodic reaction.**

**NPCA Technical Services engineers answered:**

You will find the appropriate guidance for your application in Subsection 4.16 of the Concrete Reinforcing Steel Institute Manual of Standard Practice.

We are not aware of any provisions that would exclude splicing of epoxy-coated and black rebar specifically related to your reference to a cathodic reaction. However, the use of uncoated rebar and reinforcing steel or another dissimilar metal to zinc should not be spliced to zinc-coated reinforcing.

Jeline writes:

**What is the frequency of rebar testing in precast?**

**NPCA Technical Services engineers answered:**

Depending on the specifications, reinforcing steel used in precast applications



within the United States should conform to ASTM International standards or equivalent American Association of State Highway and Transportation Officials standards. These standards dictate the welded wire reinforcement or steel bars' composition, size, weight, tensile strength and deformations. The steel must meet these specific requirements at the time of manufacturing.

Testing the steel beyond that is at the discretion of any other governing body or the individual plant, and depends on what the steel is used for.

The steel reinforcing manufacturer (rebar or wire) is required to conduct material testing in accordance with specific ASTM material standards and at a frequency prescribed within those standards. Typically, that frequency is for each heat of steel produced and those results are recorded on the mill certificates for that lot of steel reinforcement. Most precast concrete plant certification programs, including NPCA's, require the precaster to maintain



records of the specific steel mill certificates received with the steel shipment. Included within those mill certificates are the tested strength and material compositions for the steel within that lot.

Any additional testing such as yield or ultimate strength is typically not performed unless it is specified or sampled by the governing body having jurisdiction, or is included within the precaster's specific quality control plan.

Reinforcing steel manufacturers producing reinforcement in accordance with ASTM A1064, A615 and/or A706 are required to publish the ladle analysis for chemistry and conduct performance tests for the physical attributes of a particular heat of material per the applicable standard.

For specific information regarding how many pieces or what percentage of the lot manufactured is tested by the steel manufacturers, contact a rebar supplier. You can receive a list of rebar supplier contacts by visiting [precast.org/find](http://precast.org/find). ■



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# SCMs in Concrete:

## Natural Pozzolans

By Kayla Hanson

**Editor's Note:**  
*This is the final article in a four-part series detailing the types of supplementary cementitious materials (SCMs) available and the role they play in concrete's strength.*

**N**atural pozzolans have been used as a cementitious material for thousands of years. The earliest use shows lime and diatomaceous earth being used together as a cementitious binder by ancient civilizations near the Persian Gulf. The invention of “modern” portland cement in the early 1800s – nearly 7,000 years after the first recorded natural pozzolan use – did not end their use as a binding agent in concrete. Rather, the U.S. Bureau of Reclamation began extensive research to better understand natural pozzolans’ impact on heat of hydration and concrete durability in mass concrete applications.

Natural pozzolan use in North America expanded during the early-to-mid 1900s with the construction of a series of public works projects including numerous dams and the Los Angeles Aqueduct. Unlike earlier civilizations that relied on raw natural pozzolans, most modern applications call for calcined or heat-treated natural pozzolans.

### NATURAL POZZOLAN BASICS

A pozzolan is a siliceous material that possesses little cementitious value by itself. However, if it is finely divided in the presence of moisture, it will react with calcium hydroxide to form calcium silicate hydrate and other cementitious compounds. It can be used as a substitute for cement in concrete mixtures. The most common natural pozzolans used in concrete applications today include calcined clay, calcined shale and metakaolin. Other types of natural pozzolans that are used less in modern applications include volcanic ash, volcanic glass (pumicite and obsidian) and rice husk ash, among others.

Natural pozzolans are sourced from natural mineral and volcanic deposits. Some minerals like clay or shale require heat treatment to transform them into pozzolans, while others like volcanic ash exhibit pozzolanic behavior with minimal processing.





**“Natural Pozzolans lend themselves incredibly well to mass concrete applications, be it dams or foundations, anything where you need to maintain a low heat of hydration and keep water in the system for a long period of time.”**

– Ken McPhalen, *Advanced Cement Technologies*

### **CALCINED VERSUS RAW**

The process of turning clay or shale into calcined clay, metakaolin or calcined shale involves applying significant heat to the material. The process causes reactions that incorporate oxygen into the material's structure, effectively altering its makeup and behavior, and transforming the material into a pozzolan. After the calcination process, the calcined material may be further processed before finally being ground into a fine powder suitable for use as a supplementary cementitious material.

Metakaolin is considered a unique type of calcined clay. Metakaolin is produced by using a higher-temperature calcination process specifically on kaolin clay before being ground finer than traditional calcined clay. The high material fineness along with the different calcination process results in metakaolin exhibiting behaviors different from ordinary calcined clays.

Some materials, like volcanic ash, can exhibit pozzolanic behavior in their raw form without calcination or extensive processing. These are sometimes referred to as true natural pozzolans.

limestone or pozzolans. ASTM C595 Type IP blended cement defines portland-pozzolan blends, while Type IT indicates a ternary blend, which could include OPC, a pozzolan and a third cementitious component.

### **POZZOLANIC REACTIONS**

Like other pozzolans, natural pozzolans react with water and calcium hydroxide to produce calcium silicate hydrate. CH and CSH are both products of portland cement hydration reactions. However, CH is porous and contributes little strength to cement paste while CSH is denser and serves as the main strength-building agent as concrete cures.

The reactivity and behavior of any SCM will vary depending on the parent material and the final makeup of the processed SCM, as well as the dosage rate, constituent materials, curing and other parameters.

Generally, pozzolanic reactivity is influenced by particle size, material composition and temperature. As particle size decreases, the total surface area of the particles increases and allows the reactions to occur faster. The composition, and specifically the glass and calcium contents, will also impact reactivity. Pozzolans tend to react faster when used in conjunction with a high-alkali portland cement, or with increasing temperature.

### **IN THE PLANT**

As an SCM, natural pozzolans are typically used as a partial replacement for ordinary portland cement or as a substitution for fly ash. The replacement or dosage rates vary depending on the pozzolan and the desired concrete characteristics and behavior.

“For true natural pozzolans (non-calcined), replacement rates tend to mirror the replacement levels of fly ash,” said Ken McPhalen, manager of technical services at Advanced Cement Technologies. “On average, you’re looking at anywhere from 20% to 30% cement replacement by weight. For metakaolin, it’s much lower – around 8% to 10% for most high-performance applications.

“Dosage levels could be bumped up in those situations when you’re addressing a specific challenge, like mitigating alkali-silica reactivity.”

During batching, natural pozzolans may be incorporated into the mixer as an individual component separate from cement, or as a blended cement. ASTM C618, “Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete,” dictates chemical and physical requirements for natural pozzolans, which fall under Class N.

ASTM C595, “Standard Specification for Blended Hydraulic Cements,” outlines requirements for hydraulic cement blended with other cementitious materials like slag,

### **PHYSICAL PROPERTIES**

Calcined clay and calcined shale are often used in general purpose concrete applications. These natural pozzolans range in size. However, roughly 2/3 of the particles must be smaller than 45 micrometers, in accordance with ASTM C618.

Metakaolin, on the other hand, is often employed in special applications where very low permeability or high strength is needed. On average, metakaolin particles exhibit diameters ranging from 1 to 3 micrometers.<sup>1</sup> For comparison, silica fume particles are less than 1 micrometer, with average particles having diameters of 0.1 micrometer. Although ordinary portland cement grains have a broad particle size distribution that depends on the ASTM

C150 cement type classification, only a small percentage of particles may be less than 5 micrometers while the majority of particles are less than 45 micrometers.

#### EFFECTS ON FRESH CONCRETE

Calcined clay and calcined shale tend to have similar effects on many fresh concrete properties. Both materials generally have no impact on water demand, but both have a tendency to increase workability. Unlike metakaolin, calcined clay and shale usually show no significant impact on air content. Additionally, calcined clay and shale have little effect on bleeding and segregation because the particles are, on average, slightly larger than portland cement grains. Significantly finer particles, as with silica fume or metakaolin, lower the bleed rate and the bleed capacity. Calcined clay and shale have little to no effect on setting time.

“One of the benefits you will achieve with true natural pozzolans is a slower hydration, which for larger sections will reduce the build up of heat,” McPhalen said. “The true natural pozzolans tend to retain water, which, if you can balance your mix design correctly, will release that water much more slowly into the system which tends to lead to less cracking over time as well. True natural pozzolans have an affinity for water and you really need to take that into consideration in your mix design.

“They are much slower reacting too, so you may not be

able to turn forms as fast.”

Although metakaolin is a type of calcined clay, it behaves differently than traditional calcined clays. Metakaolin’s extremely small particle sizes cause it to increase water demand and decrease workability. Additionally, concrete made with metakaolin often displays lower air content. An added benefit of metakaolin’s fineness is its tendency to decrease bleeding and segregation. Also, like calcined clay and shale, metakaolin displays no measurable impact on setting time.

The general assumption regarding natural pozzolans’ impact on heat of hydration is that it will be measurably lowered. However, the heat of hydration when working with metakaolin is assumed to be about equal to, or slightly greater than, that of ordinary portland cement, typically ranging from 100% to 125% that of OPC.<sup>2</sup>

“With metakaolin, you can turn the forms faster simply because the product is going to react quicker and it won’t penalize you for slower hydration,” McPhalen said.

#### EFFECTS ON HARDENED CONCRETE

Calcined clay, calcined shale and metakaolin can all improve concrete’s durability. Specifically, natural pozzolans are known to increase corrosion resistance and sulfate resistance, decrease permeability and absorption, and reduce alkali-silica reactivity. These benefits are largely attributed to the materials’ pozzolanic behavior, which decreases concrete’s permeability and increases density and strength by consuming CH and producing CSH. Like fly ash, slag cement and silica fume, natural pozzolans also contribute to increased long-term strength gain.

Other characteristics related to concrete durability like impact resistance and abrasion resistance are unaffected by the use of natural pozzolans or other SCMs. These

#### THE MOST COMMON NATURAL POZZOLANS

used in concrete applications today include calcined clay, calcined shale and metakaolin.

“One of the **benefits** you will achieve with true natural pozzolans is a **slower hydration**, which for larger sections will **reduce** the build-up of heat.”

– Ken McPhalen, *Advanced Cement Technologies*



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attributes are related to concrete's compressive strength as well as aggregate characteristics. Additionally, natural pozzolans show no significant impact on freeze-thaw durability, which is heavily dependent on concrete's water-cementitious material ratio and air void system as well as concrete's compressive strength and aggregate characteristics.

In terms of architectural products, McPhalen had a few words of caution.

"Some natural pozzolans that are calcined become exotic colors, while those that don't get calcined tend to have a fairly consistent color," he said. "With architectural precast, you may want to think more about metakaolin, which is generally produced under color specifications to prevent variations. It's used more for high-performance applications where you're looking for higher strengths or ultra-low permeability, as well as in architectural applications, where the white color is a benefit to the aesthetics of the project."

#### AVAILABILITY AND OPPORTUNITIES IN YOUR PLANT

Although natural pozzolan availability is not dependent on manufacturing industries as is the case with fly ash, slag cement or silica fume, the existence of appropriate clays or shales does vary by region.

Natural pozzolans, whether raw or heat-processed, are valuable in many unique applications including mass concrete pours or where enhanced durability, improved ASR resistance or increased resistance to chemical attack are desired.

"They lend themselves incredibly well to mass concrete applications, be it dams or foundations, anything where you need to maintain a low heat of hydration and keep water in the system for a long period of time," McPhalen said. "Those are the applications where natural pozzolans will really shine."

If you are new to using natural pozzolans or SCMs altogether, McPhalen said to ask yourself these questions first, "What is your true purpose for wanting to use these materials? Is it the technical benefits? Is it to reduce your CO<sub>2</sub> footprint in your mix design?" Once you know that, it's a little easier to find the right ingredient that will meet those demands.

It's important to weigh the benefits and drawbacks associated with each SCM and carefully proportion and adjust any mix design in accordance with the manufacturer's recommendations, governing standards and specifications.

"As with any new product, they all have their quirks," McPhalen said. "Full testing is imperative to determine your ultimate water demands and recalibrate your chemical admixture demands within those mix designs. You really have to go start to finish and do full and thorough testing to truly understand the product you're now introducing into your mix.

"The next step beyond that is to make sure the quality control and production staff understand what it is that they're now dealing with, because as best as you can make your mix design, it can be destroyed in a hurry if it's not handled properly. It's to everybody's benefit to understand what the new concrete is going to look like and how it will behave." **PI**

*Kayla Hanson is a technical services engineer with NPCA.*

#### REFERENCE:

1, 2 Portland Cement Association Design and Control of Concrete Mixtures

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# PRACTICE WHAT YOU PREACH:

## Tips for Welding Rebar

Master the art of welding rebar at your precast plant.

By Andrew Hayward, PE.



**P**recast concrete is a versatile product that offers quick and efficient installation, which reduces a contractor's time in the field. This is one of the biggest selling points of precast products. Though we preach this to our customers, contractors and specifiers, there are still many precast producers who do not practice what they preach in their own plants. Specifically, I am referring to the production and installation of prefabricated rebar reinforcing mats and cages.

Many plants still tie and build their rebar cages around forms. While there may be some instances where there is no other option, producers can often save production time by prefabricating rebar reinforcement. A common remark from precasters is, "Wire ties will not provide a rigid or strong enough connection to keep the cage in tolerance or even hold together during transportation of the reinforcing cage to the form."

The solution is welded rebar reinforcement. Welding rebar cages and mats allows them to be easily transported – without worry – to the yard or into forms. The welds provide a rigid and structural connection that will keep the bars in their correct locations during movement, form setup, pouring and vibrating.

For many, welding rebar has been deemed unacceptable or difficult to do. However, it is just the opposite. It is acceptable and practical as long as certain standards and practices are followed. These standards and practices include:

- ▶ Selecting the correct rebar
- ▶ Determining and performing the proper preheat, if needed
- ▶ Selecting the correct filler (welding rod or wire)
- ▶ Selecting proper weld, metal preparation and placement

## **SELECT THE CORRECT REBAR**

### **ASTM A615 rebar**

The first important step is the selection of the proper rebar for your application. The most common rebar used in concrete reinforcing is produced in accordance with ASTM A615/615M, "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement." This rebar's chemical makeup and physical properties vary from structural steel. Rebar is typically less ductile with a higher tensile strength.

These properties are a result of the chemical makeup of the rebar, in particular the carbon content. Higher carbon content adds difficulty to making a sound weld, and is typically the reason offered for not welding rebar. The National Precast Concrete Association Quality Control Manual for Precast Concrete Plants states in Section 4.2.2, "Welding of ASTM A615 reinforcing steel is not generally an acceptable practice." However, if the carbon equivalency (C.E.) for A615 steel is calculated to be .55% or less for rebar

sizes up to #6, and less than .45% for bars larger than #7, the rebar can be welded with no preheating. This specification is found in American Welding Society D1.4/D1.4M, "Structural Welding Code-Reinforcing Steel." The carbon equivalency can be calculated by using the equation:

$$C.E. = \frac{\%C + \%Mn}{6}$$

The percentages of the carbon and manganese can be found in the mill certificates provided with your rebar shipment.

### **ASTM A706 rebar**

Another option is rebar manufactured to meet ASTM A706/706M, "Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement." This rebar can be differentiated from A615 bar by the "W" found stamped on the bar. This rebar is considered weldable and is required to have a carbon content of .55% or less. Therefore, the carbon equivalency is not required to be calculated. However, it is advisable to perform the calculation to verify the rebar supplied meets the carbon requirements. You will also want to perform the calculation if you are using rebar larger than #6 because carbon equivalency will dictate the preheat temperature required, if needed. To calculate the carbon equivalency of ASTM A706 rebar, you must use the equation:

$$C.E. = \frac{\%C + \%Mn}{6} + \frac{\%Cu}{40} + \frac{\%Ni}{20} + \frac{\%Cr}{10} - \frac{\%Mo}{50} - \frac{\%V}{10}$$

Again, all of these percentages are found in the rebar mill certificate.

## **DETERMINE THE PREHEAT TEMPERATURE**

Once the carbon equivalency has been calculated, Table 5.2 of AWS D1.4 should be referenced to determine if preheating is needed for the rebar. Table 5.2 provides the minimum temperature required to preheat the rebar prior to welding. For most rebar that can be welded under the carbon equivalency, there is no preheat temperature required. If the C.E. value is higher or a larger diameter rebar is used, the preheat temperature for the rebar may be anywhere from 100 to 500 degrees Fahrenheit. For typical precast reinforcing, it is uncommon for rebar to require a preheat in excess of 100 F. If it is determined that your rebar requires a preheat temperature minimum, the rebar to be welded must be brought up to the minimum temperature stated. In the case that different pieces of rebar are welded together, both must be brought to the minimum preheat required by the bar with the highest preheat temperature. For instance, if you are welding a #5 rebar that requires no preheat to a #6 rebar that requires 100 F preheat, both bars must be preheated to a minimum of 100 F.

One final consideration is cold-weather welding. If you stockpile your rebar outside and the temperature is

less than 32 F, all rebar (regardless of C.E.) must be brought to 70 F prior to and during welding.

### SELECT THE CORRECT FILLER

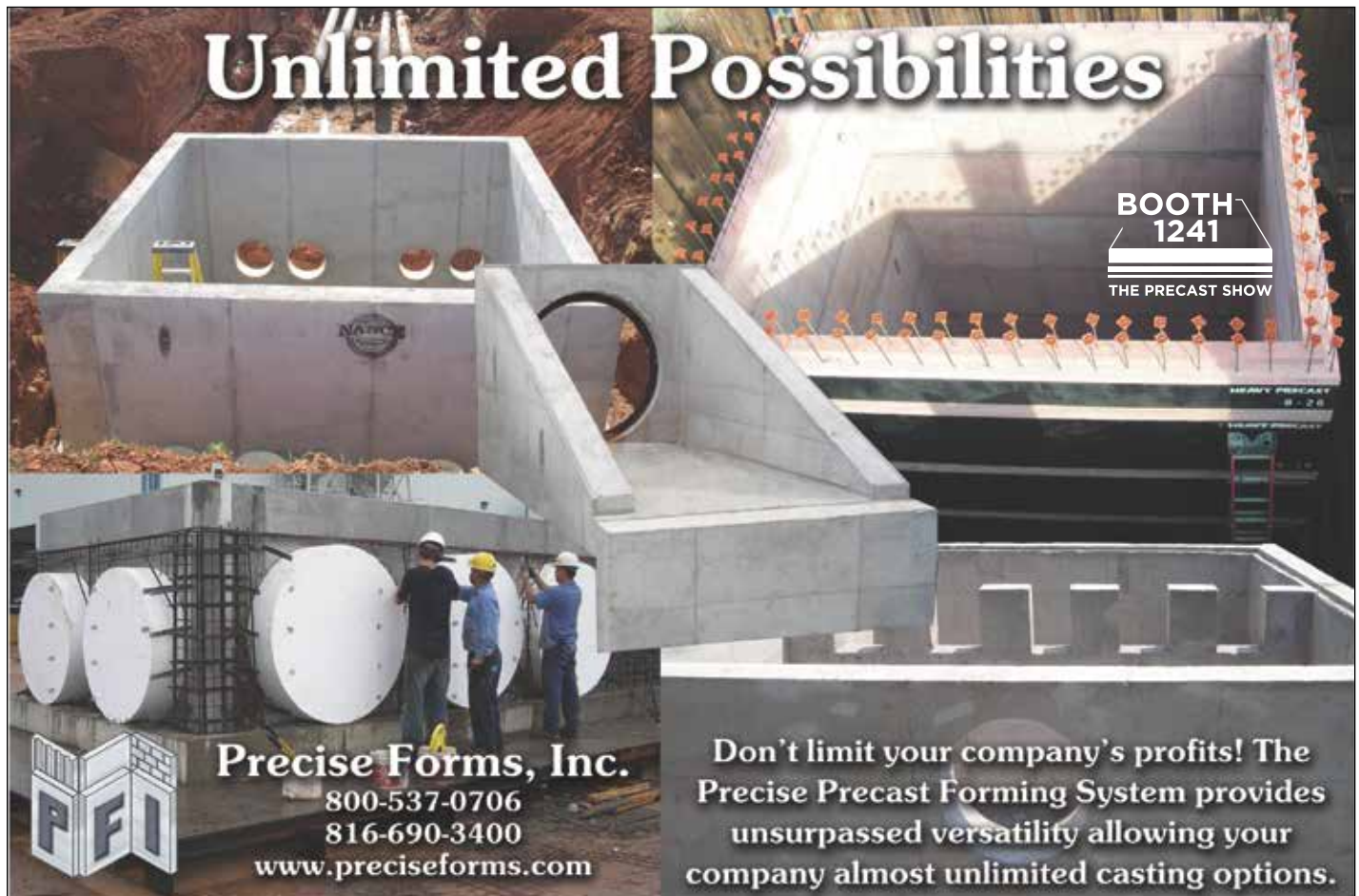
Another important factor that must be considered is the method of welding and type of filler metal. Under AWS D1.4, there are three options available for welding rebar. These are Shielded Metal Arc Welding (SMAW, commonly called arc or stick welding), Gas Metal Arc Welding (GMAW, commonly called MIG or wire feed) and Flux Core Arc Welding (FCAW, wire feed with flux-coated wire in place of gas).

Table 5.1 in AWS D1.4 provides the requirements for filler metal needed to weld the rebar. An example would be the method for A615 grade 60 rebar. If the method of welding was SMAW, an electrode of E9015-X, E9016-X, E9018-X or E9018M would be used. If using the GMAW method, an electrode of ER90S-XXX or E90C-XXX would be required. If two different bar grades or specifications are welded together, the electrode for the rebar with the higher tensile strength is used. For example, if an A706 grade 60 bar is welded to a A615 grade 60 bar, the electrodes required for the A615 grade 60 are used. This is because the tensile strength of the A615 rebar is 90,000 psi while the A706 rebar is only 80,000 psi.

In addition to the preheat and filler requirements listed in AWS D1.4, there is also a section illustrating the allowable types of joint welds. These include butt joints, lap joints and splices. However, under AWS

D1.4 there is no provision for bars crossing at 90 degrees to each other. For mats or cages requiring welding bars that cross perpendicular to each other, ASTM A184/A184M, "Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement," provides guidance and should be considered the standard. Under this specification, the producer must ensure that all bars are "substantially parallel and perpendicular to each other." The standard requires all joints around the perimeter of the mat or cage be welded, but only every other bar for interior intersections.

Once all the requirements for preheat, electrodes and welds have been established, the reinforcement can be welded. For reinforcing that goes in a stock product, it is a good idea to build a jig to speed up production and ensure the bars are in the correct location at all times during the fabrication of the reinforcing cage or mat. In the absence of a dedicated fixture, other items such as clamps and vise grips are recommended to keep bars in their correct location. It is important to take time in this step. If a mistake is made or a bar moves during welding and is determined to be out of tolerance, it must be cut and repositioned. Depending on the severity of the cut, additional splicing or an entire bar replacement may be needed. When preparing reinforcement, ensure it is free of dirt, mud, water, snow, flaking or pitting rust and form oil prior to welding. These items will prevent a thorough weld and will negatively affect the concrete-to-rebar bond. Minor surface rusting that has not pitted or damaged the bar will not create any issues and is



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typically acceptable. After the welding has been finished, make sure to chip and remove any slag that is on the welds. This is typical of SMAW and FCAW welds. Inspect to confirm the welds are of sufficient size and provide uniform penetration into both bars. Once you are finished, allow the welds to cool naturally. Never accelerate cooling, as this will likely negatively affect the structure of the bars. At this point, the rebar cage or mat is ready to stockpile until time of use.

### MAKING BETTER PRECAST

Welding rebar cages may seem like a daunting procedure with many standards to adhere to; however, it is actually a fairly simple process. The preparation time calculating carbon equivalency and determining correct preheat, rebar and filler is very minimal. These steps boil down to a few minutes that can be performed by a quality control technician or other trained individual at the time the rebar is received. Plants can help streamline the process by selecting a single class of electrode that covers the majority of rebar varieties used. In addition, purchasing ASTM A706 rebar ensures that it is always at or below .55% carbon equivalency. Rebar chairs and/or wheels can be installed ahead of time as well to save a few minutes when installing the cage into the form. This all adds up to a higher quality, more efficient and safer precast product due to the precise and secure placement of the rebar. **PI**

*Andrew Hayward, P.E., is the production and quality control manager at Panhandle Concrete Products in Scottsbluff, Neb.*

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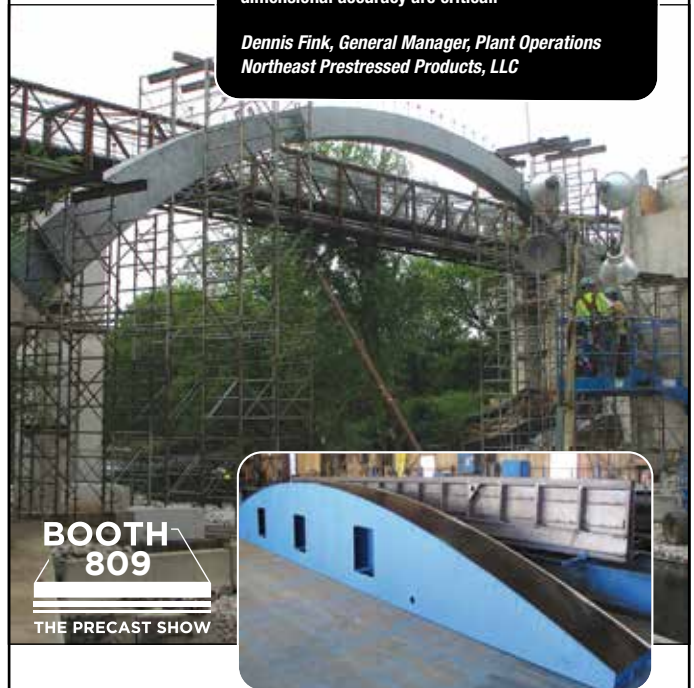
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**21**

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# Measuring Compressive Strength

Avoid common mistakes while measuring the compressive strength of concrete.

By Mitch Rector

**Editor's Note:** This article is intended to serve as a reference guide for entry-level production employees.

**M**anufacturing a quality precast concrete product is a lot like grilling a good steak. One major consideration is how long you wait. The longer you wait, the longer the steak takes up valuable space on the grill, and if you wait too long you'll overcook the meat. However, if you remove it too early, it may not have a good sear or be undercooked.

Just like you can use a poke test to determine how far along a steak is during cooking, you can use a test to determine the strength of your concrete. But instead of a light touch with your finger, a specialized piece of equipment is used to apply several thousand pounds of force.

## DIFFERENT DAY STRENGTHS

Concrete's strength comes from a chemical reaction between cement and water. This creates a paste, binding the aggregates together. As time progresses, more cement can react, causing the concrete to become stronger. The strength of the concrete is not just important for design, but also for production. In wet-cast production, the earlier concrete reaches a minimum stripping strength, the sooner it can be removed from a form and the form can be used for the next product. So how are stripping and design strengths determined?



Compression tests provide a precaster an easy method to track concrete trends that may occur due to material changes or environmental conditions, so they can make needed adjustments.

## THE COMPRESSIVE TESTING PROCESS

A concrete compressive strength test machine works by progressively applying force on a specimen. Because strength is defined as the maximum load carried divided by the average cross-section area, the most logical way to determine the strength of a specimen is to load it until it fails. However, this would be impractical to perform for all precast concrete products. Instead, small concrete cylinders are cast and used. Cylinders are commonly 4 by 8 inches or 6 by 12 inches in size. These specimens are easy to cast and require little storage space, especially when produced in large amounts. It is important to cast the cylinders using the same concrete mix so cylinder strengths can be compared.

According to the National Precast Concrete Association Quality Control Manual for Precast Concrete Plants, section 5.3.5.4, at least four compressive strength specimens must be cast for each 150 cubic yards of concrete of each mix or once every week, whichever occurs first. Two specimens are tested at or before seven days after casting. The average of the two specimens helps keep quality consistent. The same process is repeated with two other specimens at or before 28 days after casting.

It is important to fully test the specimens until failure.

**!**  
**At least four compressive strength specimens must be cast for each 150 cubic yards of concrete of each mix or once every week, whichever occurs first.**

– NPCA Quality Control Manual for Precast Plants, section 5.3.5.4





“A lot of people don’t take them through until failure,” said Alan Pritchard, quality manager at Smith-Midland Corp. “You can’t know the concrete strength unless you take the cylinders through until failure.”

These specimens let you model the design compressive strength of your concrete. Additionally, section 4.6.1 states that one-day compressive tests must be performed at least quarterly for each mix design. This adds up to a lot of time, energy and materials. It is important to cast and test cylinders correctly so that the data you receive is accurate.

### COMMON MISTAKES

Mistakes can slow down production and more importantly reduce the quality of concrete. There are three common mistakes to avoid when performing a compression test: inappropriate cylinder treatment, misalignment and improper loading rates.

Everything from shape to storage to moisture content will affect the strength of a specimen. While the sizes of a cylinder can vary, it is important to aim for a 2-to-1 length-to-diameter ratio. If the produced cylinder has a length-to-diameter ratio of 1.75 or less, appropriate correction factors will need to be applied. If the length-to-diameter ratio is greater than 2, it can be trimmed down.

“A lot of groups don’t really look at that or treat cylinders with two diameters that are out of the normal tolerance,” Pritchard said. “They don’t recognize that that’s a large difference in your cross-sectional area.”

Moisture is another common problem when handling or storing cylinders. Due to the chemistry of cement, a dry specimen can show a higher strength than a damp one. This could cause major problems if of the two 7-day specimens tested, one is wet and the other is dry.

“Pretty often they are pulled out and not kept moist-cured up until the time to break them,” Pritchard said. “According to ASTM, the ones that require moist curing should be broken while still damp.”

Another common problem can arise from how the specimen fits into the testing machine.

“The ones that are probably showing the largest impact on the breaks to me would be alignment in the machine, proper seating of the bearing surfaces and making sure the cylinder is centered,” Pritchard said.

A specimen that is misaligned or off-center can develop a point load, which will cause side fractures at the top or the bottom.

Section 7 of ASTM C39 states, “Place the plain (lower) bearing block, with its hardened face up, on the table or platen of the testing machine directly under the spherically seated (upper) bearing block.” Then the upper and lower bearing faces are wiped clean before the specimen is placed on the lower bearing block. When unbonded caps are used, the caps should be centered on the cylinder. The specimen is then aligned with the center of thrust through the spherically seated block.

Finally, it is important to use a proper rate of loading when testing a specimen. A low rate of loading will cause the test to take a long time. Additionally, a low rate of loading will cause the specimen to undergo creep, generating lower strength results. Conversely, high loading rates will affect the material properties of concrete by temporarily increasing the compressive strength. This means that the strength of the specimen will not accurately reflect the properties of the mix. What is a proper loading rate, then?

ASTM C39 states that the rate of loading must be applied continuously and without shock or sudden increases. An acceptable load rate is 28-to-42 psi. A higher loading rate is allowed in the first half of the loading phase, but it must be applied in a careful and controlled manner to avoid shock loading. As the suspected failure load approaches, it is important to not adjust the loading rate. It’s important to be mindful that the rate a specimen is loaded is a significant part of performing an accurate compression test. Once the test is complete, caution must still be taken.

“The one biggest issue I’ve had in the past would be transposition and documentation and not getting everything recorded properly,” Pritchard said. “They might transpose a number or record it on the wrong sheet.”

This small part can cause the biggest problems, so always ensure that you are recording the right numbers in the right place.

### BE ALERT

All it takes is a split-second distraction to cause a steak to head into well-done territory, and all it takes is a quick moment of carelessness to render a day’s work invalid. Being alert of every step in the testing process is an important part of creating a quality piece of concrete. **PI**

*Mitch Rector is a technical services engineer with NPCA.*

Through concerted efforts in each Oldcastle Precast plant, safety and health has been transformed into a key value.



Photo courtesy Oldcastle Precast

# TOP 5 TIPS

for Creating a

# CULTURE *of* SAFETY

Encouraging employee engagement.

By Mindi Zissman

**D**espite modern technology and systems knowledge, more than 10% of concrete manufacturing workers still experience a job-related illness or injury annually.<sup>1</sup> This is most often caused by human error, including equipment misuse or improper form. Maintaining safety is the highest priority for any job, including those in the precast concrete industry, and it doesn't have to be difficult.

Experts say getting employees involved in prevention is key to creating a culture of safety across the precast concrete plant. According to Cal Larson, CSP, SPHR, vice president of environmental, health and safety for Oldcastle Precast in Chandler, Ariz., Oldcastle plants in Newnan, Ga., and Concord, N.C., recipients of the first National Precast Concrete Association 2017 Safety Hall of Fame award for no recordable accidents in five years, are creating a culture of safety when managers give employees ownership of the safety parts of their job.

This means allowing employees to create safety procedures they know work, partner with others who do their job to watch over each other, assume responsibility for the cleanliness of their area, report their near misses and more.

"We need to look at safety as a core business value, not as a priority, because priorities change and can fall by the wayside," said Michael Cunningham, environmental, health and safety compliance manager for Oldcastle Precast. "Safety is a part of our business. From purchasing equipment to creating standard operating procedures for a specific task, safety needs to be incorporated into it all."

For Oldcastle, the numbers tell the tale. Over the last decade, the company has successfully reduced its Total Case Incident Rate from 8.3 in 2006 to just 1.87 in 2016, which is significantly lower than the latest recordable national average of 4.7 from 2015.

Here's a list of five tips for encouraging active employee engagement and creating a safe environment for the entire precast concrete plant.

**TIP #1** **WRITE VISIBLE OPERABLE PROCEDURES**

The first step in giving employees ownership of their safety is to have them write Visible Operable Procedures for their job. At each plant, gather employees that do the same job and have them work together to write a single job description, detailing the optimal safety procedures and parameters of each expected task. These VOPs should serve as official job descriptions for defining each position and training new employees.

**TIP #2** **ENGAGE IN BEHAVIOR-BASED SAFETY OBSERVATIONS**

Behavior-Based Safety Observations look to identify the positive things each employee is doing right and ensures they're reliable and repeatable. Again, this is accomplished through active employee engagement. Each day, employees observe the way their peers do the same job. When employees engage in safe behaviors on the job, they are encouraged. When performing their work in an at-risk way, employees conducting BBSOs coach the others to do it the correct, low-risk way. Conducted by peers – not managers – the goal of the BBSO is to open the relationship between employees to have real-time conversations about safety on the job.



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“Try to implement a continuous process of improvement based on risks and hazards your employees are dealing with on a regular basis.”

– Michael Cunningham, Oldcastle Precast

Although BBSO isn't a new concept, Larson said many precast plants aren't using it. Oldcastle Precast relies on it heavily to identify safe behaviors and encourage them. “We use the BBSOs to go out and reinforce the behaviors we want employees to replicate day after day, to have employees looking to help each other,” said Larson. “You're not hearing it from someone who has never done your job; you're hearing it from someone who does the job just like you.”

According to Larson, 90% of Oldcastle's 72 U.S. plants are doing BBSO safety observations via tablet on the plant's floor. This data is then observed, tracked and trended on a company-wide dashboard for all employees to see. Between June 2016 and June 2017, Oldcastle plants completed 19,000 BBSOs.

**TIP #3 MAINTAIN A 5S ENVIRONMENT**  
 Keeping any workplace clean and organized will keep it safer. This is never truer than at a precast concrete plant. The 5S methodology is a Japanese workplace organizational method, translated into English as: sort, set in order, shine, standardize and sustain.

Setting up a workplace to be efficient, easy to understand and maneuver around includes:

- **Sorting** things that aren't needed in the daily process such as removing items used only monthly.
- **Set in Order**, or keep each area organized by what's needed when.
- **Shine or scrub** paint and keep the area looking like a place employees want to return to daily.
- **Standardize** means creating a standard flow of doing things in the space that everyone agrees to and abides by consistently.
- **Sustained** means having employees commit to maintaining the area in these ways daily.

For example, take the 5S functions in a precast plant.

**SORT** – Each team member will work together to make a list of the tools they use, how often they use them and what they're used for. If the tool doesn't have a regular purpose, it's removed from the area.

**SET IN ORDER** – The items needed for the area are organized and in good shape.

**SHINE** – The area is cleaned and painted. Employees are assigned to keeping it this way.

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**STANDARDIZE** –If there’s a tool used in a particular location, the team ensures it is stored at the point of use. Each gun is labeled. Every morning and night, the team ensures the area looks the same.

**SUSTAIN** – A 5S owner is established for the area. At the beginning, throughout the day and at the end of the shift, the 5S owner ensures everything is in its proper place.

**TIP #4** **ACTIVATE A NEAR MISS REPORTING NETWORK**  
Research has shown that serious accidents or loss incidents are often preceded by warnings, or near miss incidents where an injury, damage or loss was very near. Recognizing and reporting these events can significantly improve workplace safety. Precast concrete plants can engage in near miss reporting by creating call-in, in-person or online network reporting policies and procedures.

The reporting network should be non-punitive, have the potential to be anonymous and reported events should be investigated to identify root cause and system or equipment weaknesses. But don’t stop there. Next, analyze these events to determine what could have been prevented. Follow through and create new safety rules or systems and hazard control to reduce the same risk down the road. Most importantly, publicize the success of the changes implemented as a direct result of the near miss reporting with all employees. This will reinforce the process and employees will see firsthand that their near miss was taken seriously.

**TIP #5** **HOLD DAILY HUDDLE MEETINGS**  
Each shift or team should start and end its day with a huddle. If there are five different departments in a plant, there should be five different huddles. If there are three shifts over a day, there will be three shifts of five huddles.

The purpose of a morning huddle is to see that everyone is set for work, discuss non-routine jobs that might have increased elements of risk, any new forms, jobs or new pieces of equipment. Should an employee come to work under the weather or injured, the supervisor will know they need to make accommodations. Discussing safety in each morning huddle can get everyone engaged in preventing risk from the start. The morning huddle could last as few as 10 minutes or as long as an hour, depending on the situation.

At the end of the day, the afternoon huddle can serve as a time to wrap up, discuss who is staying late to finish up a job, determine if anyone was injured and if the team accomplished its goals.

### ONE DAY AT A TIME

Creating a culture of safety won’t happen overnight, but is possible through strategic planning that includes writing VOPs, conducting BBSOs, maintaining a 5S environment, instituting a near miss reporting network and holding huddles twice daily.

While these initiatives are sure to cost time and money, keep in mind the ultimate goal is ensuring safety on the job for current and future employees as well as achieving the greater goal of minimizing risk company-wide.

“If you’re just looking to be in compliance with OSHA, state or local regulations, you’re missing the boat,” Cunningham said. “Try to implement a continuous process of improvement based on risks and hazards your employees are dealing with on a regular basis. OSHA might say we’re required to implement fall procedures at 4 feet, but can our employees still get hurt if they’re working on a platform that’s 3 feet, 11 inches?”

“The answer is yes. We have to put controls in place so they can still perform their job in a safe manner.” **PI**

*Mindi Zissman is a Chicago, Ill.-based freelance writer who has covered the AEC industry, commercial liability and health care for more than 15 years.*

### RESOURCE:

1 Occupational Safety and Health Administration (OSHA), [https://www.osha.gov/Publications/concrete\\_manufacturing.html](https://www.osha.gov/Publications/concrete_manufacturing.html)

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# THREE GENERATIONS STRONG

**Dura-Crete** continues to hold tight to family values, but isn't afraid to manufacture new products and go beyond market boundaries.

By Sara Geer





Dura-Crete has remained on the same 15-acre plot since it was founded in 1954.

Dura-Crete provides a wide selection of underground and custom precast products. They have delivered or shipped product to job sites as far as Louisiana.



T

raditions passed down in a family are important to maintain because they help the next generation understand beliefs, values, practices or rituals. Some are passed along, others are used as a foundation for making new ones. The same holds true for a family business. As ownership changes, established operation methods can continue to be used or new ideas can emerge that help the company evolve and embrace change. At Dura-Crete, each generation has added integral components, and the current generation is ready to take things one step further.

### KEEPING A GOOD THING

Dura-Crete, based just outside Salt Lake City in West Lake City, Utah, has seen many changes in the precast industry over the decades. The company was among the first group of precasters to join the National Precast Concrete Association in 1966. Founder Frank Moeller, NPCA Board of Directors chair in 1971, like many early members manufactured the Unit Step product, as well as septic tanks. As the first Utah producer member, Moeller set the bar high for competitors in the area since membership gave them an advantage for acquiring bids on submitted project drawings. While the company no longer manufactures steps and family members have retired, NPCA has remained an important partner for each generation. From networking with other precasters to





**“WE TRY TO SEE HOW WE CAN REACH A MIDDLE GROUND WITH EACH CUSTOMER AND TREAT EVERYONE EQUALLY.”** – Brittney McKean, *accounts manager*

providing updates on specifications or standards that directly impact how they manufacture, deliver and install precast concrete products, NPCA has always played a significant role.

“At first, we were going to the conventions; back then it was more a social event,” said Chris McKean, company president and Moeller’s grandson. “But now we can actually keep up with the standards that are important to us. NPCA helps keep every precaster on the same playing field.

“Even when you are not a member, you are still held to the same standards that we are.”

Along with keeping their NPCA membership, third-generation owners McKean and his wife, Brittney, have preserved other “old-school” practices, including providing hand-drawn blueprints and tracking company drivers using a clipboard wall organizer. According to McKean, the personal aspect of the drawings is important since it shows the customer specifically what is in every precast box manufactured.

“For instance, there are certain jobs that need specific rebar spacing, or have a hole located in a different spot on the box,” he said. “It’s actually pretty simple. We also keep that personal aspect since it feels like we took the time to follow the needs for them.”

Additionally, searching for a software that works to keep operations organized has been challenging. Rapid changes in technology happen too fast and too sudden to justify making some significant changes said Brittney, Dura-Crete’s accounts manager.

While the company has kept these methods, enhancements in technology have helped it better meet customer needs and demands. Scott Morse, general manager of sales, has worked with every owner. He remembers when customers used to visit the office holding large project plans. Today, the plans are sent by email and the size of the prints are smaller. In addition, communication changes allow the company to receive project bids requiring custom work unlike anything it has done before and send its drivers to locations Frank Moeller wouldn’t have dreamed of.

#### **ON THE ROAD**

Dura-Crete has been a stable community neighbor, having remained on the same 15-acre plot of land since it was founded. Brittney said keeping the business small and family-oriented has resonated well with their customers and employees.

“A lot of our customers know right away who to go to for the information they seek,” she said. “I would even say while the economy was low, we haven’t really changed, maybe just increased our prices here and there.

“We try to see how we can reach a middle ground with each customer and treat everyone equally.”

The company focuses on maintaining high-caliber customer service. Most customers know the staff on a personal level and have remained loyal through each generation of ownership. However, staying competitive has always been the biggest challenge.



NPCA file photo



NPCA file photo

Dura-Crete ensures its products comply with Utah Department of Transportation's standards and specifications. UDOT recognized the company for its dedication to maintaining high quality.



Photo courtesy of Dura-Crete



NPCA file photo

“There are about 30 precasters in our area, used to be only six, and now they are all big,” McKean said. “We have customers that will tell us, ‘We’ll probably go with you, but we have to get bids from other companies.’ So, there is definitely tough competition out there.”

One advantage Dura-Crete offers customers is it can deliver, organize off-loadings and set the product at the job site. Many of the drivers in the company’s fleet have been employed for 20-plus years and are familiar with every stage involved in the manufacturing process – from building the forms to placing the product on-site. Having an expert present in the field has also recently been very beneficial since the company has made many deliveries to job sites outside of Utah – even as far as Louisiana. According to McKean, the drivers are often the first point of contact for customers and

are knowledgeable enough to find a solution without sending the product back to production.

“They will also be proactive and follow up with the customer after installation to see how our product is meeting their needs,” Brittney said.

Since the drivers are the most visible aspect of the company and act as the face of the company, each truck is professionally painted with Dura-Crete’s branded yellow. In addition, each driver is allowed to design their own truck, which helps them add a personal touch.

“For example, the son of one of our employees plays baseball, so the employee had a baseball design added to the truck,” Brittney said. “Some added the American flag or fly fishing. It’s to show that we care about them and that they are not just drivers, but integral to the success of this business.”



**“WE’RE CONTINUOUSLY WORKING TO MAKE OUR PRODUCTS BETTER THAN BEFORE.”** – Chris McKean, *president*

Along with making their drivers feel special, the owners have made a push to improve employee morale by celebrating everyone’s birthday and organizing a large Christmas gathering at the end of the year. According to McKean, celebrations have always been a big part of the company in the past and future, but initiating a culture change has been a slow process.

“We used to just celebrate birthdays in the office, but this year we gave everyone a birthday card with a small incentive,” McKean said. “That was something that needed to change. We’ve also mixed up the Christmas party a bit by adding our own touches and keeping ideas from the past.”

#### **BRANCHING OUT**

Along with changing the work culture, the company has also started to slowly expand its product lines and accept more custom projects. According to McKean, Dura-Crete offers a wide selection of underground precast products such as septic tanks, holding tanks, grease interceptors, dry well sections and catch basins. Above-ground product lines such as parking bumpers and landscape pavers have

also been added due to the recent rise in commercial and residential construction.

“Pavers, septic tanks and grease interceptors are in high demand because of the residential and business economic growth,” McKean said. “Our stock is always low since it’s a high commodity.”

Recently, Dura-Crete was hired to manufacture new precast park signs for Salt Lake County. The project required the company to create the product drawings and design the custom wood forms used to cast the signs. McKean said he especially liked this project since it allowed the company to show its creative side.

“This project has been fun to work on and drive around and see,” he said. “The best part is they want us to do more.”

Another unique project the company worked on included manufacturing several items for the 2002 Winter Olympics hosted in Salt Lake City, such as grease interceptors for temporary parking areas and signs for the Olympic Park. It has also manufactured several red bollards that were shipped to Oregon, test barriers for an army base in Fort Polk, La., and wall caps that were shipped to Hawaii for use on the new Hawaiian temple.

However, while the company is not afraid to work on challenging, creative projects, it continues to refine its production processes for



Photo courtesy of Dura-Crete

## “WE ENSURE OUR EMPLOYEES GET A MIXTURE OF DIFFERENT TRAINING FROM HANDS-ON EXERCISES TO BRIEF HUDDLES.” – Chris McKean, *president*

its precast concrete septic tanks. Septic tanks are a high commodity product in Salt Lake City and surrounding areas, so much so that the company is finding it hard to keep the product in stock.

“Spring and summer are usually the time when we start getting calls for septic tanks,” McKean said. “We build septic tanks every day to try and keep up with the demand.”

### **EXCEEDING EXPECTATIONS**

Dura-Crete was recognized by the Utah Department of Transportation for complying with its certifications and standards. Brittney said the company also keeps up with Utah’s environmental laws and each city’s specific manufacturing requirements.

“Each city here has their own engineers employed that want a septic tank or box to be built a specific way, but all are state certified,” Brittney said. “For instance, on certain boxes the holes may be moved up slightly, but we stay on top of all information and the needs of our customers.”

Along with keeping up with standards, Plant Manager David Frye holds weekly training and safety meetings with production staff to ensure the products are manufactured accurately and efficiently. Dura-Crete takes pride in providing a quick production turnaround time for all customer requests – within 5-to-7 days at the maximum – and ensuring staff members are well trained so they can succeed. For example, Dustin Wagstaff, Dura-Crete’s new quality control

manager, has jumped right into learning and attaining the needed QC qualifications laid out by the American Concrete Institute, UDOT and NPCA Plant Certification.

“We ensure our employees get a mixture of different training from hands-on exercises to brief huddles to remind them to stay hydrated during the summer heat,” McKean said. “Also, during production, the quality control manager may find something and bring it to our attention and the general manager will then discuss it with everyone as a learning opportunity.

“We’re continuously working to make our products better than before.”

### **BEATING THE ODDS**

It’s rare to see a company survive through three generations, let alone remain at the top of the competition, but that’s exactly what Dura-Crete has done. And while operations, technology and quality have improved, the goals of the company have remained the same throughout each generation: stay competitive, grow with the economy and remain family-oriented. Staying true to these has helped Dura-Crete thrive by simultaneously cherishing traditions and embracing change. **PI**

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

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# Teamwork

## MAKES THE PRECAST DREAM WORK

By using **team-building strategies** and helping employees understand their efforts and opinions matter, precasters **cultivate strong workforces**, improve productivity and run safer plants.

By Bridget McCrea

**T**eamwork and camaraderie are not innate aspects of a workforce and cannot be established quickly or easily. They take time, effort and investment to build and must be continually fostered as personnel and the outside environment change. However, for business owners and managers who succeed in creating them, the rewards are many.

For Megan Kitchner, building them on the precast plant floor requires a two-pronged approach that incorporates both emotional and physical elements. For example, using positive reinforcement instead of negative reinforcement helps her create an enjoyable and productive work atmosphere in her role as general manager at Sarasota, Fla.-based Atlantic TNG.

“I always ask my employees for help, and I always say ‘please’ and ‘thank you,’” she said, noting that simple gestures go a long way in making employees feel valued.

Recently, Atlantic TNG began handing out “I Love My Job” T-shirts to employees in an effort to stoke conversations about what people like about their jobs.

“This was mostly for the employees’ benefit, to get them thinking about it and actually saying it out loud,” Kitchner said.

The exercise generated some heartfelt responses from employees, such as providing food for their families, a reason for getting up each morning, and working with their individual teams and not letting them down because “this is like a second family.”

A patch-off at Lindsay Precast in Canal Fulton, Ohio, is used as a teaching opportunity and provides employees a chance to show their knowledge and skills.



The physical elements of teamwork are equally as important, according to Kitchner, who said company employees work together to donate time and resources to charities and organizations through fundraising events.

“We celebrate holidays and have general meetings with food and an open forum so everyone feels like a part of the company,” Kitchner added. “We also give out ‘I Love Precast’ shirts to individuals who come up with a suggestion to help productivity, make a process better or easier, or improve morale.”

Recently, for example, one Atlantic TNG employee suggested a company outing where team members could picnic, socialize and play football. Another mentioned his love of a past event, where a truck came on-site and handed out ice cream to employees. Kitchner said the company is now working to put the events together in the near future.

“We’re going to have that ice cream truck come back next week,” said Kitchner, who covers the cost of the ice cream. “It’s so hot – everyone just loves it.”

Kitchner also set up a Wellness Committee that focuses on initiatives like “wake up and warm up” stretches that build teamwork while also teaching some good life skills to prevent injuries.

“The employees would laugh, show off, and just in general enjoy the time together and take part in the financial coaching, nutrition workshops and positivity workshops,” she said.

In return for its team-building efforts, Atlantic TNG has cultivated an employee base that wants to help, is proud of its work and sees itself as a valued part of the company’s overall success.

“As precasters, we work too hard to not at least get the satisfaction of being surrounded by good people having a common goal and getting along with one another,” Kitchner said. “Employees want to be part of something that they’re proud of. They want to be proud of where they work, and they want to be happy with their jobs.

“And when we have happier employees, those individuals are healthier and more productive. It’s a pretty simple equation.”

## PROMOTING PRODUCTIVITY, IMPROVING MORALE

There is a lot written about the power of collaboration and community in the workforce, but not all of that thinking makes its way to the plant floor.

“Ideal teamwork doesn’t come immediately but with a few wise techniques, you can stir its growth in your team,” writes Dixie Somers in *The Power of Teamwork in Factory Management*.

Such efforts help encourage cooperation and new levels of trust, she adds, while also allowing the company to meet its goals and improve overall productivity levels.

“Sports teams encourage participation of each player towards

**“We give out ‘I Love Precast’ shirts to individuals who come up with a suggestion to help productivity, make a process better or easier, or improve morale.”**

– Megan Kitchner, *Atlantic TNG*



Photo courtesy Atlantic TNG

achieving an ultimate goal,” Somers writes. “Similarly, good teamwork within a factory setting can promote productivity, morale and a satisfied, loyal workforce.”

As a program manager at the Michigan Manufacturing Technology Center, Charlie Westra conducts workshops and training sessions focused on team-building, supervisory skills and leadership.

He plainly states that, “If you’re not interested in building your teams, then you’re probably not interested in building your business.”

That’s because leaders and teams make or break businesses – a fact that can be tracked from management to the sales team to the plant floor.

For precasters, the need for good team-building in production isn’t always obvious, said Westra, nor is it easy to orchestrate. That’s because most manufacturers promote employees based on individual motivation levels.

“In many cases, it’s the top performers who get promoted, yet they don’t always have the skills to help others with their own motivation,” Westra said. “The notion is that the new manager’s or leader’s work ethic will simply rub off on the team. But that rarely ever happens.”

To avoid this problem, Westra said precasters should focus on

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Team-building activities help employees improve their communication, motivation and understanding of one’s strengths and weaknesses.

training, particularly when it comes to leadership and management skills. At a very basic level, he said initiating programs that reward workers for a job well done is a good starting point. A plant that meets its safety goals for the quarter, for instance, could be treated to a Friday afternoon barbecue in the parking lot. Or, a specific team that exceeded its productivity goals for the week could receive cash or individual restaurant gift cards.

“When it comes to showing appreciation, the gestures don’t have to be huge,” Westra said. “In many cases, simply connecting with workers on an individual level and regularly communicating appreciation are enough to help stoke teamwork, loyalty and collaboration on the plant floor.”

## COMPETITIVE TEAM BUILDING

Knowing that many of its plant employees thrive on friendly competition, Lindsay Precast’s Canal Fulton, Ohio, plant holds patching competitions that not only pit workers against one another, but that also help the company achieve its training goals. The premise is simple: provide two similar structures that have suffered the same damage and the raw materials necessary to do the patch, and have two employees go head-to-head to solve the problem.

“A newer employee can challenge anyone – even a manager or a tenured employee – to a patch-off,” said Dean Wolosiansky, general manager. “After our morning meeting and safety talk, everyone gathers around to either watch or participate in the event.”

Even before the patch-off takes place, employees rally around one another and rile each other up.

“It really brings everyone together kind of like a sporting event,” Wolosiansky said.

Judged not only on speed and time, but also on quality of

workmanship, the competitors work quickly to get their patches completed first. Observing the competition serves as a learning tool for newer employees.

“They can see firsthand what we’re looking for in terms of work quality and in terms of the tolerances and aesthetics for any type of patch work,” Wolosiansky said.

With a plethora of team-building resources right at their fingertips, precasters that aren’t already fostering effective collaboration can start by using these strategies that Bryan Mattimore, co-founder of Norwalk, Conn.-based Growth Engine Innovation Agency uses with his company’s manufacturing clients:

**1. BRAINSTORMING STATIONS.** In a technique called triggered brainwalking, two-person teams go to their brainstorming station set up around a room and write down ideas. Then teams rotate to their neighbors’ stations and build on or add new ideas to the ones already written down.

“It’s a great way to generate dozens and dozens of more ideas than in a traditional brainstorming session,” Mattimore said. “Most importantly, everyone at every level gets a chance to contribute.”

**2. PUBLIC WHITEBOARDS.** Precasters can post whiteboards in public spaces, rooms or hallways and post a creative challenge on the whiteboard. Next, invite employees to contribute by writing down ideas, usually over a seven-to-10-day period.

“It’s a great way to get ideas from everyone in the plant and without having to hold a formal meeting/brainstorm session,” Mattimore said.

**3. THINK MODULAR.** Mattimore encourages precasters to get rid of conference tables in their meeting rooms and replace them with “modularizable” tables.

“It’s much easier to be creative, productive and collaborative when teams are at islands of tables versus one big conference table,” Mattimore said.

Whether they’re using whiteboards or advanced software, T-shirts or hands-on competitions, today’s manufacturers continue to find innovative ways to keep collaboration, camaraderie and team-building a focal point on their plant floors. According to Kitchner, such initiatives should always start with a simple goal in mind: to get everyone positive, upbeat, on the same page and ready to work. The good news is that in many cases, all it takes is a leader’s or manager’s attentive ear to help make that dream work.

“People want to know that their voices are being heard and that what they’re doing really matters,” Kitchner said. **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.*



Photo courtesy Atlantic TNG



# Working For You

The NPCA professional staff works to expand the use of quality precast concrete products in many ways. To keep you informed of these ongoing efforts, we created the Working For You page at [precast.org/working-for-you](http://precast.org/working-for-you). This recap provides a high-level overview of staff activities throughout the past two months.

Visit the **Working For You** page to read the full stories or learn more.

## Certification and Specifications

Rich Krolewski, director of certification & regulatory services, continues to promote precast and NPCA Plant Certification at the federal, state and local levels. NPCA Plant Certification was added to requirements in Washington, D.C, Tampa, St. Louis, and Georgia, as well as with the New York Transit Authority. It is also now included in ARCOM's MasterSpec program. Inclusion in MasterSpec is the culmination of more than six years of work. His work, along with other professional staff members, also resulted in the exemption of A-frame trucks from OSHA's crane certification requirements as well as a one-year delay of the overall crane certification implementation date from Nov. 10, 2017, to Nov. 10, 2018.



## Specifier and Student Outreach

NPCA professional staff members have made presentations to a total of 561 specifiers and produced a webinar that reached 307 specifiers through July 31. Four specifier-specific webinars are planned for later this year on wastewater, MSE walls, precast paving, and innovation in engineering and precast.

## Codes and Standards

As of July 31, NPCA professional staff members have attended or been on conference calls for 19 meetings as they actively participate on 37 groups, committees, etc.

## Marketing

Visits to [precast.org](http://precast.org) via targeted advertisements remain strong with 80,617 through July 31, 2017. Precast Solutions is being sent to an additional 10,000 specifiers per issue, including the Winter, Spring and Summer issues in 2017. NPCA's Facebook and Twitter accounts have gained 8,561 new followers this year and had 230,208 engagements such as likes, shares, comments and retweets.

## Other Activity

### NPCA professional staff exhibit and train at NEHA Conference

National Precast Concrete Association professional staff members Claude Goguen, P.E., LEED AP, director of sustainability & technical education, and Mitch Rector, technical services engineer, traveled to



the National Environmental Health Association's Annual Educational Conference. NEHA represents more than 5,000 members involved in environmental health protection and management. The two exhibited at the show and Goguen presented two sessions, one on septic tank inspection and the other on grease interceptor design.

# 2017 NPCA WEBINAR Schedule

DATE	TOPIC	INSTRUCTOR	PRICE
Sept. 14	How to Become the Smartest Person in Your Plant: Calculating the Center of Gravity	Claude Goguen, P.E., LEED AP	\$89 Per Location
Oct. 19	How Your Local Manufacturing Extension Partnership (MEP) Can Help You Pay to Train Your Employees	Torsten Schimanski, New Jersey MEP	\$89 Per Location
Nov. 2	Alternate Types of Cement	Evan Gurley	\$89 Per Location
Nov. 7, 9, 14, 16*	PQS II – Technical**	Claude Goguen, P.E., LEED AP	\$495 Per Person
Dec. 7	Sales and Marketing Alignment: A Key to Revenue Growth	Bryan Gray, Revenue Path Group	\$89 Per Location

\* Attendance at all sessions is required for PQS II webinars.

\*\* Due to the advanced math concepts covered in PQS II – Technical, students are required to take and pass NPCA's PQS II Technical Math Prep course as a prerequisite for this course. The math prep course is offered as a free online course to students enrolled in PQS II – Technical. Students must complete the online course and pass the exam by Tuesday, Oct. 31, to participate in this course.

NPCA conducts **webinars** throughout the year, providing precasters with **vital education** for all facets of running a precast plant.

All webinars begin at noon Eastern.

For course descriptions and registration, visit [precast.org/2017webinar](http://precast.org/2017webinar)

# Think you know your stuff?

## Prove it by answering the following question.

Send your response to Kayla Hanson, technical services engineer, at [khanson@precast.org](mailto:khanson@precast.org), and if yours is the correct answer (chosen randomly from among all correct answers), you will receive one free admission to one of our 60-minute webinars. We will accept one answer per person. **Good luck!**

### JULY/AUGUST CHALLENGE ANSWER:

$TM C \text{ agg} = (18.62 - 18.39) / 18.39 \times 100 = 1.25\%$   
 $TM F \text{ agg} = (12.54 - 12.01) / 12.01 \times 100 = 4.41\%$   
 $FM = TM - AC$   
 $FM \text{ ca} = 1.25 - 0.95\% = 0.30\%$   
 $FM \text{ fa} = 4.41 - 2.1\% = 2.31\%$   
 $\text{Water in c agg} = 1945 \times 0.30\% = 5.835 \text{ lbs of water}$   
 $\text{Water in f agg} = 1245 \times 2.31\% = 28.76 \text{ lbs of water}$   
 $\text{Total additional water: } 34.595 \text{ lbs}$   
 $\text{Water quantity goes up to } 310.595.$   
**Answer 0.50 would be the new w/c ratio.**  
**Original was 0.45**

## Challenge Question:

An 8 foot long by 4 foot wide by 5 foot, (outside dimensions including lid and base) septic tank is being installed underground. The walls are 4 inches thick, base is 6 inches thick and the lid is 6 inches thick.

The tank will be buried under 6 inches of soil. The top of the groundwater is 2 feet from the top of the soil.

### What will be the total uplift force due to buoyancy?

This can be calculated by hand or by using the NPCA Buoyancy Calculator found at [precast.org/Buoyancy-Calculator](http://precast.org/Buoyancy-Calculator)

CORRECTION

# NPCA Plant Certification's Top 25 Plants

*The list of the NPCA Plant Certification Program's Top 25 plants recently published in the NPCA Membership Directory and Buyer's Guide did not include three plants on the list. We apologize for the error. Here is the complete list of plants, based on certification audit scores from 2016. Congratulations to the Top 25!*

Bethlehem Precast Inc., Bethlehem, Pa.

C.R. Barger and Sons, Lenoir City, Tenn.

Champion Precast Inc. Troy, Mo.

Encore Precast, Seven Mile, Ohio

Forterra Pipe and Precast-Lenoir City, Tenn.

Forterra Pipe and Precast-Dayton, Ohio

Forterra Pipe and Precast-Elizabethtown, Ky.

Gillespie Precast-Chestertown Md.

Granite Precasting & Concrete Inc., Bellingham, Wash.

H2 Pre-Cast, East Wenatchee, Wash.

Jamestown Macadam Inc., Celoron, N.Y.

Kistner Concrete Products Inc., Lockport N.Y.

Lindsay Precast Inc., Canal Fulton, Ohio

Mack Vault of Toledo, Bowling Green, Ohio

Monarch Precast Concrete Corp., Allentown, Pa.

Monarch Products Co. Inc., York Haven, Pa.

MSE Precast Ltd., Qualicum Beach, B.C.

Oldcastle Precast Inc., Middle Island, N.Y.

Oldcastle Precast Inc., Idaho Falls, Idaho

Pallette Stone Corp., Saratoga Springs, N.Y.

Seminole Precast Manufacturing Inc., Mason, Ga.

Southern Concrete Materials, Fletcher, N.C.

Speed Fab-Crete, Kennedale, Texas

Trenwa Inc., Florence, Ind.

WASKEY, Baton Rouge, La.

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# NPCA Foundation Sponsors ASCE National Concrete Canoe Competition

By Marti Harrell

The NPCA Foundation continually seeks opportunities to expand its outreach to students by introducing them to the features and benefits of precast concrete. In 2016, the Foundation began sponsoring the American Society of Civil Engineers National Concrete Canoe Competition. There, whether they realize it or not, students have already manufactured a piece of precast, which makes it a great opportunity to have a conversation about the precast industry and share information about the Foundation's scholarship programs.

This year, the competition was held at the Colorado School of Mines in Golden, Colo., and included 20 schools from the U.S., Canada and China. During the competition, the Foundation hosted a hospitality tent

for students where Foundation Board members and NPCA professional staff shared information about the precast concrete industry, job opportunities, and Foundation scholarships for concrete canoe teams and for students pursuing degrees related to the industry.

"The NPCA Foundation is very excited to be a part of the Concrete Canoe Competition," Richard Isaacson, NPCA Foundation chairman, said. "It has continued to increase its outreach to students and professors to raise awareness of the Foundation and its internship programs and scholarships plus the advantages of precast."

In addition to the Foundation's involvement as a sponsor, NPCA Technical Services Engineer Kayla Hanson served as a member of the five-person judging panel. As

a judge, Hanson rated schools based on their design papers, oral presentations and canoes. In addition, the concrete canoe races also impact the school's final score.

"There are stringent requirements that must be met in each aspect of the competition, both big and small," Hanson said. "From mix proportions, dimensions and raw material documentation to scheduling, budgeting and answering judges' technical questions before an audience of hundreds of your peers. It's great practice and exposure, and it's an invaluable learning opportunity."

"Each team dedicates hundreds of hours to their project throughout the year, so it's really rewarding to see all their hard work come to fruition."

Of the 13 schools awarded \$500 Concrete Canoe Competition scholarships from the NPCA Foundation, three made it to nationals, including Fairmont State University, South Dakota School of Mines and Technology and Milwaukee School of Engineering.

Schools participating in the Concrete Canoe Competition must adhere to rules. Detailed design papers are submitted as part of the competition. Papers must include mold and canoe construction information as well as canoe finishing techniques. In addition, the papers must detail the canoe's mix design and justification. Mill certs, material safety data sheets and technical data sheets are also required. The schools must explain how they resolved issues with the previous year's canoe and justify why the choices made are an improvement.

During both the regional and national competitions, each team must present their





NPCA file photo

canoe in a science fair format. The canoe is displayed on dry land with an accompanying booth showcasing materials and processes used to manufacture it. Each team must also offer an oral presentation, which includes questions from the judges. The competition wraps up with a variety of concrete canoe races for speed, maneuverability and endurance. All three pieces of the

competition – display, presentations and races – are evaluated to calculate the school’s final score.

This year, California Polytechnic State University sailed away with the first place prize. Cal Poly’s concrete canoe weighed 230 pounds and was christened “Meraki,” which means “pouring one’s heart and soul into a project.”

The NPCA Foundation has agreed to sponsor the 2018 ASCE National Concrete

Canoe Competition in San Diego and to again provide scholarship opportunities to participating schools.

“The ASCE National Concrete Canoe Competition allows the NPCA Foundation to interact with hundreds of civil engineering students throughout the country and beyond,” said Marti Harrell, NPCA

Foundation executive director. “Many of the students have very little exposure to precast during their college classes, so having the opportunity to meet with them face-to-face allows us to fill in the missing pieces of what they learned in their materials and structures analysis classes in college. The NPCA Foundation Board is excited to get more involved with the regional competitions too, and encourages NPCA members to reach out to universities in their areas participating in the competition to provide materials and expertise to the canoe teams.

“It is a great way to build an ongoing relationship with engineering schools and future specifiers.”

To see the complete results from the 2017 competition and to learn more about ASCE’s Concrete Canoe program, visit [asce.org/concrete-canoe-results](http://asce.org/concrete-canoe-results). **PI**

*Marti Harrell is NPCA’s vice president of technical services and professional development and is the NPCA Foundation executive director.*



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# 2017 NPCA FOUNDATION Scholarship Recipients

In 2017, The NPCA Foundation awarded 20 scholarships to undergraduate students pursuing studies related to civil engineering, architecture and construction-related curricula. The scholarship provides financial aid and increases the student's awareness of the many benefits precast concrete products can provide the specifying community. The NPCA Foundation thanks NPCA members who sponsored the winning recipients.

Beginning with the 2017 scholarship, students are required to work a minimum of 320 hours at an NPCA member company each year in order to receive payments for years two, three and four. The NPCA Foundation encourages NPCA members who are interested in volunteering as a potential internship location to contact Marti Harrell, NPCA Foundation executive director, at mharrell@precast.org or (317) 571-9500. **PI**



**Noah Baughman**  
School: *University of Florida*  
Major: *Engineering*  
Sponsor: *Atlantic TNG*



**Jacoby Hicks**  
School: *Howard University*  
Major: *Civil Engineering and Architecture*  
Sponsor: *Smith-Midland Corp.*



**Nancy Perez**  
School: *University of Texas at Tyler*  
Major: *Civil Engineering*  
Sponsor: *Oldcastle Precast*



**Nikolaos Benyamin**  
School: *New Jersey Institute of Technology*  
Major: *Concrete Industry Management*  
Sponsor: *Garden State Precast*



**Andrew Hodge**  
School: *California Polytechnic State University, San Luis Obispo*  
Major: *Architectural Engineering*  
Sponsor: *H2 Pre-Cast*



**Adam Wieser**  
School: *University of Wisconsin – La Crosse*  
Major: *Engineering and Mathematics*  
Sponsor: *Vaughn Concrete Products*



**Jessica Burns**  
School: *California State University, Chico*  
Major: *Concrete Industry Management*  
Sponsor: *Jensen Precast*



**David Juan**  
School: *University of Texas at Arlington*  
Major: *Architecture*  
Sponsor: *Oldcastle Precast*



**Jordan Wilks**  
School: *Auburn University*  
Major: *Engineering*  
Sponsor: *Spillman Company*



**Carlos Enriquez**  
School: *California State University, Chico*  
Major: *Concrete Industry Management*  
Sponsor: *Jensen Precast*



**Max Legacy**  
School: *Western Kentucky University*  
Major: *Concrete Industry Management*  
Sponsor: *Hamilton Kent*

**Not Pictured**

**Elias Agia**  
School: *Drexel University*  
Major: *Architecture*  
Sponsor: *Altomare Precast*



**Olivia Giannetta**  
School: *Olivet Nazarene University*  
Major: *Architectural Engineering*  
Sponsor: *Dalmaray Concrete Products*



**Elias Magana**  
School: *California State University, Chico*  
Major: *Concrete Industry Management*  
Sponsor: *Jensen Precast*

**Joanna Martin**  
School: *University of Tennessee*  
Major: *Architecture*  
Sponsor: *VanHooseCo Precast*



**Aaron Grudowski**  
School: *Illinois Institute of Technology*  
Major: *Civil Engineering*  
Sponsor: *Concrete Specialties*



**Deborah Ogulaja**  
School: *University of Texas at Tyler*  
Major: *Civil Engineering*  
Sponsor: *Oldcastle Precast*

**Noah Mueller**  
School: *Metropolitan Community College*  
Major: *Concrete Industry Management*  
Sponsor: *Panhandle Concrete Products*

**Van Schular**  
School: *Philadelphia University*  
Major: *Architecture*  
Sponsor: *Mayer Bros. Inc.*

**Cody Stauffer**  
School: *California State University, Chico*  
Major: *Concrete Industry Management*  
Sponsor: *Jensen Precast*

*Congratulations to all the 2017 NPCA Foundation scholarship recipients.*





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# The BEST *of* Precast Sustainability

## The 2017 NPCA Sustainability Awards showcase four winning entries.

By Claude Goguen, PE., LEED AP

**P**rotecting aquatic life. Reducing dependence on fossil fuels. Facilitating material ingredient disclosure. Enhancing energy consumption measurements. These are some of the basic tenets of sustainability. They also describe the four award-winning entries in the National Precast Concrete Association's 2017 Sustainability Awards. The awards were presented in Cleveland, Ohio, during The Precast Show 2017. Here are the descriptions of the winning entries.

### **PRODUCER PROJECT**

**WINNER: Cape Fear Precast**

**PROJECT: Wave Attenuators**

Beach erosion, destruction of aquatic plant life and a decrease in fish population are all problems faced in coastal North Carolina. In 2016, NPCA member Cape Fear Precast, North State Environmental and the North Carolina Department of Transportation – with help from Boy Scouts of America Troop 879 – worked together on a product to restore submerged aquatic vegetation.

The Bonner Bridge, which is the only highway connecting Hatteras Island to the mainland, is currently being replaced. Replacement permanently impacts nearly 3 acres of submerged aquatic vegetation. Aquatic vegetation is vital in helping stabilize coastal shorelines and also provides food and shelter for aquatic life. Substantial changes in the vegetation could drastically reduce the physical integrity of the coastline as well as the marine life population. With the expected damages that will occur during construction



Photo courtesy Cape Fear Precast



of the new bridge, resulting changes in sea grass populations due to different wave patterns and the amount of sunlight on the vegetation must be mitigated. Once the amount of wave energy is reduced in this area of the project site, it will allow for a more continuous cover of submerged aquatic vegetation.

A 500-foot wave break consisting of 101 wave attenuators was designed to become a permanent “living” structure. Each unit consists of a base section with several discs stacked on top of one another. These structures are designed to fully attenuate the wave energy while allowing the passage of water and organisms around and through. Once in place, the top two discs remain above water during the normal high water level. This will allow for new links between aquatic and intertidal environments. The discs below the surface provide even more habitat for small fish to breed and hide as well as an area for oysters to attach. The units are loaded onto a specially designed barge and lowered with a customized mini excavator around pylons driven to a depth of 20 to 30 feet. This design will help the structures to withstand hurricane conditions.

## PRODUCER PLANT

**WINNER: Norwalk Concrete Industries**

**PROJECT: Solar Photovoltaic System**

A common challenge among precast manufacturers is the planning that comes with expansion. Norwalk Concrete Industries in Norwalk, Ohio, was in the midst of such planning in early 2015. One of the expansion concepts was a larger roof with mounted solar panels. However, after a thorough analysis, NCI realized they needed to engage a consultant to help with solar field sizing and financial impact analysis while providing a road map and step-by-step instructions to navigate the regulatory process, grant application and tax consequences. A payback analysis demonstrated that the greatest financial return to NCI was in sizing a field that was between 70% and 80% of peak power requirements. A larger power installation did not have the payback potential and smaller grids were nearly as expensive with less total power available.

Challenges included the new construction being in the flight path of the local airport, a restrictive power repurchase agreement with the local power company, a long-term power purchase contract that was already in place, and the wait time for federal and state grants to assist with construction. The original intent to roof-mount panels was quickly abandoned after the costs of reinforcing the roof for wind load and long-term maintenance were calculated. The field was moved slightly to the north to offset local pilot concerns regarding panel reflection and distraction of the field in the airport approach.

NCI ultimately installed a 135-kilowatt, ground-mount renewable solar field in early 2016. The \$600,000 installation has an expected 25-year life span and at peak plant operation can provide 75% of the total electrical requirements for the 32,000-square-foot manufacturing plant and support areas. The generated power returned monthly is \$1,400 on average. Resale of excess capacity offsets purchased power by \$400 to \$500 per month.



## ASSOCIATE PRODUCT

WINNER: BASF

PROJECT: GreenCircle Certification

The demand for more building product transparency requires manufacturers and producers to become more knowledgeable about the products that they are providing as well as the raw materials that are being used to manufacture or develop their products. In the precast concrete industry, this requires a deeper understanding of the chemicals and substances associated with the finished products – from cements and aggregates to admixtures, release agents and surface treatments.

In early 2016, BASF set out to reduce the complexity for precast concrete producers to comply with LEED v4 requirements for material ingredient disclosure. Following the credit requirements, a producer would need to know the chemical inventory of the ingredients used in their finished product to at least the 0.1% (1,000 parts-per-million) level. Since this level of disclosure is not accessible through safety data sheets alone, additional details would be necessary for each ingredient and from each vendor. When dealing with unique products which are based heavily on proprietary chemistries, the information can be difficult to obtain.

Working with GreenCircle Certified, a third-party certification organization that ensures independent verification of a company's environmental claims, BASF began the process of evaluating their Product Compliance Management process for conformance to the manufacturer inventory reporting requirements developed for LEED v4. Since GreenCircle created the LEED v4 compliance certification in conjunction with USGBC and is currently the first and only third-party certifier offering this type of industry-distinctive certification, it was clear that the pathway to compliance would be through collaboration with GreenCircle.

The arduous task included a review of all systems, information and processes required to evaluate, designate and report the required hazardous aspects of all

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substances including impurities to the 1,000-ppm level for each chemical admixture. The assessment verified that all hazard classification, assessment and communication is conducted within the provisions of North American countries' regulatory requirements and GreenCircle used these results to certify that the Manufacturer Inventory Reports meet the LEED v4 Material Ingredient, Option 1 reporting requirements.



To read more information about these and past entries, visit [precast.org/sustainability](http://precast.org/sustainability)

## ASSOCIATE PLANT

**WINNER: Command Alkon**

**PROJECT: Plant Energy Management Program**

Managing energy use is an attractive option when exploring sustainable strategies. One challenge is finding ways to increase efficiency and reduce energy use, but a bigger challenge is to know how much energy you're using and where.

Based in Atlanta, Ga., Command Alkon provides software and technology for producers, suppliers and contractors across many construction sectors. One of its latest developments is Command Alkon Plant Energy Management (CA-PEM), an energy-intelligence platform that collects data at the device level. The wireless, non-invasive sensors enable multi- or single-site plants to quickly and easily collect real-time energy consumption data on all critical loads in each facility without disrupting the business operation, and in a cost-effective way.



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Photo courtesy Command Alkon

CA-PEM features a cloud-based online analytics platform that enables users to examine detailed, actionable insights at the individual device level, across multiple locations. Such insights are used not only to increase energy efficiency, but also to help enterprises manage their facilities more efficiently and cost-effectively. This system is designed to help operations and technical managers better manage their equipment and associated business processes in a standard, centralized platform across dispersed geographies. Users are able to make improvements across all energy asset life cycles.



Graphic courtesy Command Alkon

The NPCA Sustainability Committee thanks these green pioneers for setting the example and demonstrating the spirit of innovation the precast industry is known for while reinforcing the fact that precast concrete is a sustainable and resilient building material. If you are an NPCA member and are interested in submitting an entry for the 2018 awards, contact Claude Goguen, P.E., LEED AP, director of sustainability and technical education, at [cgoguen@precast.org](mailto:cgoguen@precast.org) or (317) 582-2328. **PI**

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

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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](mailto:sgeer@precast.org).*

### NEW JIB CRANES FROM EMH



Engineered Material Handling's new AL Systems Aluminum Rail Jib Cranes are lightweight and include spans up to 15 feet. AL Systems Jib Cranes can be used under bridge cranes, in areas serving multiple workstations, for outdoor loading docks, or in machining and assembly areas.

Their anodized aluminum extrusions and enclosed rails maximize strength and provide longer durability. They are free-moving and do not require movement at right angles. This feature also provides smooth operation and a low starting force even when the load is at the end of the bridge.

### KION NORTH AMERICA OFFERS TWO NEW FORKLIFTS

KION North America has started production of two of its newest forklifts, the Linde Series 1347 and Linde Series 1319.

In preparation, the company has spent the past two years reconfiguring its production lines and completing facility upgrades to boost its production



capacity. Its goal is to increase capacity to 12,000 lift trucks a year by 2020.

The team designed the trucks while maintaining the compact nature of Class I and Class IV equipment. Capacities range from 5,000 to 6,500 pounds. The trucks are best suited for indoor environments including general warehousing, trucking, distribution and manufacturing applications.

### SPILLMAN COMPANY DISTRIBUTES ICON COMPOSITE CONNECTORS

Spillman Company of Columbus, Ohio, has reached an agreement with ICON of Kansas City, Kan., to be its exclusive distributor to the precast/prestressed concrete products industry in the U.S. and Canada for its complete line of patented composite shear connectors. Made with glass fibers and epoxy resin for strength and thermal efficiency, ICON composite shear connectors are available for insulation thicknesses of 2-to-4 inches.

### TAYLOR MACHINE WORKS ATTENDS MADE IN AMERICA EVENT AT WHITE HOUSE



Taylor Machine Works represented Mississippi during President Donald Trump's Made in America Product Showcase event held at the White House in Washington, D.C. The event promoted U.S. manufacturing and production.

The company delivered a new X-330S lift truck for the event. It was already on display nearby at the Smithsonian Institution's Folklife Festival. Taylor's employees handled the complicated logistics of getting "Big Red" to the White House and even got



an assist from a former employee, Michael Craven, who is currently the chief of staff for House Rep. Gregg Harper.

**PERKFILTER SYSTEM RECEIVES NJCAT VERIFICATION AND NJDEP CERTIFICATION FOR STORMWATER TREATMENT**



The performance of the PerkFilter media filtration system for stormwater

treatment has been verified by the New Jersey Corporation for Advanced Technology. Additionally, the system has been certified by the New Jersey Department of Environmental Protection as an approved stormwater treatment device based on the NJCAT verification. The PerkFilter system is now certified to remove at least 80% of total suspended solids in accordance with the NJDEP filtration protocol.

**OWENS CORNING INFRASTRUCTURE SOLUTIONS ACQUIRES CONCRETE REINFORCEMENT DIVISION OF HUGHES BROTHERS**

Owens Corning Infrastructure Solutions, part of the composites business of Owens Corning, announced the acquisition of Aslan FRP, the concrete reinforcement business of Nebraska-based Hughes Brothers.

Aslan FRP produces and markets glass- and carbon-fiber-reinforced polymer products, also known as composite rebar, used to reinforce concrete in new and restorative infrastructure projects such as roads, bridges, marine structures, buildings and tunnels.



**MANITEX INTERNATIONAL WELCOMES CRANE SALES & SERVICE TO NORTH AMERICAN KNUCKLEBOOM DEALER NETWORK**

Manitex International announced the appointment of Nebraska-based Crane Sales & Service as a Manitex-PM knuckleboom dealer for Nebraska, North Dakota, South Dakota and Iowa. According to Steve Kiefer, executive vice president of sales and marketing for Manitex International, the agreement increases the company's Midwest distribution for Manitex-PM knuckleboom cranes.

**INVESTMENT GROUP PURCHASES SIGMA INTERNATIONAL GROUP**

An investment group has acquired the entire stock of SIGMA International Group, the parent company of SIGMA Corp. and related companies. Jim McGivern, the CEO for the last eight years, will continue his association with SIGMA as an advisor. **PI**

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# CALENDAR OF Events



**Oct. 12-14, 2017**  
**NPCA 52ND ANNUAL CONVENTION**  
Loews Atlanta Hotel  
Atlanta, Ga.



**Feb. 22-24, 2018**  
**THE PRECAST SHOW 2018**  
Colorado Convention Center  
Denver, Colo.



**Oct. 4-6, 2018**  
**NPCA 53RD ANNUAL CONVENTION**  
Omni Providence Hotel  
Providence, R.I.



**Feb. 28 - March 2, 2019**  
**THE PRECAST SHOW 2019**  
Kentucky International Convention Center  
Louisville, Ky.



For the most up-to-date information about NPCA events, visit [precast.org/meetings](http://precast.org/meetings)

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