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# THE LONG & WINDING ROAD

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**On the Cover:**  
Gene and Nelson Martin pose with these two structures that subtly symbolize the one and two zeros in the figure 100 for our cover story on the 100-year anniversary of Terre Hill Concrete Products.

*Photo by Kristi Fisher*

### TECHNICALLY SPEAKING

- 5 Questions from the Field
- 6 One Thing: Concrete Consolidation
- 10 Evaluating and Diagnosing Unformed Surface Imperfections
- 14 What Precasters Need to Know About High-Strength Wastewater
- 18 Steel Reinforcement: Best Practices

### MANAGEMENT

- 32 Bringing Your Business Processes into the 21st Century

### SUSTAINABILITY

- 36 Free Software to Help NPCA Members Measure Improvement

### SAFETY

- 38 Fatal Four in Focus

### FOUNDATION NEWS

- 42 Making Networking Work: Sarah Hochmuth
- 44 2019 NPCA Foundation Scholarship Recipients

### WORKING FOR YOU

- 45 An Overview of the Past Six Months

### INDUSTRY NEWS

- 46 People & Products

### RESOURCES

- 48 NPCA Calendar
- 48 Advertisers Index
- 49 2019 Buyer's Guide

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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 blog posts or magazine articles on [precast.org](http://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).

**Joe writes:**

**It appears that the typical transition in an eccentric riser for a manhole is from 48-inch ID to 24-inch ID. Can a larger ID (say 26 inches) be provided at the top without any cost increase? Also, what is the typical height of a 48-inch ID to a 24-inch ID eccentric riser?**

**NPCA Technical Services engineers answered:** You are correct that most manhole transition sections are 48-inches-by-24-inches, either using a cone reducer or flat-top reducer. Cone sections can be concentric, but the majority are eccentric to facilitate a straight, uniform line of steps and easier ingress and egress. The 24-inch opening seems to be a size the sewer industry has settled upon for decades. Consequently, many of the casting frames specified are also for a 24-inch opening size.

The answer to your cost question is “possibly.” However, some increase in expense to the precaster will likely be passed on to the purchaser. There has been a small trend to increase the 24-inch opening, perhaps because attempting to enter a manhole and casting with the necessary personal protection equipment required today necessitates a larger opening than the traditional 24 inches.

For a flat-top reducer, the added expense of a 26-inch or 28-inch diameter opening would be minimal as it is simply a matter of placing larger diameter blockouts in the flat form. A cone reducer is more complicated. A lot of the added cost would be related to the type of forms the precaster is using to pour its cone reducers. Revising the inside diameter of the opening would require a modification to the form core and jacket.

If this revision to a larger opening will be a permanent new standard, the precaster may wish to purchase a new form fabricated specifically for the new geometry and also keep the existing 24-inch-diameter opening form for those jurisdictions within its market still using the 24-inch-diameter opening.

The answer regarding typical heights for these items unfortunately is not straightforward. They too may vary between different precast companies depending on the forms they own. It is best to check with local manufacturers to determine what the available form heights are.

**Rahul writes:**

**Is there a strength benefit to using one type of spacer over another? Or using spacers made out of one material versus another (concrete, plastic, metal)?**

**NPCA Technical Services engineers answered:** Spacers are not intended to provide any sort of compressive strength or structural integrity to the product. Spacers are used to maintain appropriate reinforcement positioning within the formwork before, during and after concrete placement, maintain the designed concrete cover over the reinforcement, and help maintain the rigidity of the reinforcement assembly.

One thing to be mindful of when using any spacer is the porosity of the microstructure at the surface of the spacer. Any time you introduce a foreign object into fresh concrete – whether it’s a spacer, anchor, reinforcing or aggregates – the microstructure of the paste at the interface of the concrete and the foreign object can be somewhat compromised with higher degrees of porosity.

This can result in a preferential path for aggressive materials to get into and move through the concrete. This is why it’s important to make sure the spacers are free of dirt, oils and especially form release. Also, an increase in surface roughness of the spacer material can slow down any migration along its surface. The bonding capacity of the spacer to the concrete will depend less on the type of material and more on the geometry, much like deformed rebar bonds better with concrete than smooth rebar.

If the structure is expected to be exposed to an aggressive environment or considerable temperature variations, then spacer type and application should be analyzed much more closely. **PI**





# ONE THING

## CONCRETE CONSOLIDATION

By Alex Morales, M. Ed.

**Editor's Note:**

*This is the fifth article in a year-long series that focuses on the details and more technical aspects of one common thing precast concrete producers do on a daily basis.*



Every precast product design assumes a dense, homogeneous, consistent mass of concrete surrounding the reinforcement embedded within it. Concrete's density, bond to reinforcement and adherence to design are critical for any structure to perform as anticipated.

As a composite material of cement paste and aggregate, however, conventional slump concrete does not flow like a liquid to completely take up the space of its container. As fresh concrete is placed in formwork, pockets of air will form. These air voids, called entrapped air, are of irregular size and shape and can compose up to 20% of the placed volume. Entrapped air will prevent proper bond to reinforcement, decrease the strength and increase the porosity of hardened concrete, all while creating formed surface defects like rock pockets, bug holes and honeycombing. These pockets of entrapped air must be remediated as completely as possible to ensure the concrete will have the density and uniformity required by design.

## CONSOLIDATION

Consolidation is the process of densifying a concrete mix by reducing the volume and proportion of voids. A consolidated mass could easily be achieved if concrete could behave like a liquid and freely flow into all corners of the form and prevent entrapped air pockets created during placement. Fortunately, we can rely on a phenomenon known as liquefaction to consolidate the mix. Liquefaction is the temporary change in behavior of a solid to a liquid due to an external shaking or rapid loading.

In order to create liquefaction of a fresh concrete mix, we need to introduce an independent force that will liquify the mixture so that it fills entrapped air pockets. The most commonly used consolidation method is vibration. Temporary liquefaction of the concrete mix by means of vibration will coax the entrapped air pockets to the surface of fresh concrete and ensure the concrete sufficiently consolidates to completely fill the formwork.

The use of vibrating equipment has long been associated with consolidating a concrete mixture. The most commonly specified procedure for consolidation by vibration is ACI 309, "Guide for Consolidation of Concrete." Much like the chemical reaction between cement and water (called hydration), the temporary liquefaction of a mix in order to expel entrapped air voids is a bit of a science.

Vibrators typically are powered by electric or gas motors, compressed air (pneumatic) or hydraulic gear motors. Electric and pneumatic are the most common in the precast industry. Regardless of the power source, there are three main factors to consider during the vibration process:

1. **Type of vibrator**
2. **Vibrator settings**
3. **Vibration time**

The specific mix design, type of form and amount of reinforcement will impact these three consideration factors.

## VIBRATOR TYPES

Concrete vibrators are divided into two major categories: internal and external. External vibrators are attached directly to formwork and vibrate the concrete through the form, while internal vibrators feature a vibrating head that is inserted directly into the fresh concrete mix.

### Internal vibrators

Internal vibrators are popular in the precast industry and consist of a power source, a shaft and a vibrating head. Internal vibration is a manual procedure requiring hard work and careful attention, but don't give in to the temptation to give the task to the newest worker. Training is crucial to the proper operation of the equipment. The operator must interpret what it means when air bubbles burst at the surface and know when to stop vibrating. An experienced operator will know when the concrete has been properly consolidated.

An internal stick vibrator should be inserted vertically into concrete under its own weight at a rate of one foot per one second. It should be withdrawn at a slightly slower rate, about one foot every three seconds. For the first concrete lift, the vibrator head should be inserted to almost touch the bottom of the form. Vibration forces extend laterally from the head, not below the tip of the head, so the operator should watch for the zone of influence, which is the circumferential area consolidated when the vibrator is inserted into the concrete. When the vibrator is inserted each subsequent time, it should be done close enough to the previous location so that the zones of influence overlap. This process should be repeated over the entire product so the whole concrete mass is affected by the radiuses of influence of all the vibrator insertions. When vibrating subsequent lifts, the vibrator head should always penetrate the lift beneath it to prevent a cold joint. The operator should also know that concrete should be vibrated in lifts of 12-to-18 inches.

Your internal vibrator's head diameter will play a role in the effectiveness of the consolidation process. The size of the head will affect the vibrator's zone of influence. The larger the head, the greater the impact on zone of influence. If you're accustomed to an insertion pattern with one vibrator, you may need to make adjustments if you must use a different vibrator with a different size head. Operators should always pay attention to the effect of their equipment on the concrete during vibration.

### External vibrators

External vibrators are often called form vibrators, but it's important to understand that while they are attached to formwork, they are designed to vibrate concrete. Their location must consider the thickness or mass of the concrete being vibrated. As a rule of thumb, external, form-mounted vibrators should not be turned on until the concrete level is at least 6 inches above the location of the vibrator. If the supplier suggests a higher concrete level above the vibrator, that recommendation of the vibrator supplier should be followed. External vibrators should never be turned on when the forms are empty. Following this recommendation will prolong the



## CONSOLIDATION TIPS

### from Plant Certification

According to section 4.4.3, Consolidating Concrete, of the NPCA Quality Control Manual for Precast Concrete Plants, "concrete shall be consolidated in such a manner that segregation of the concrete will be minimized."

A commonly cited deficiency with internal vibrators is using them to drag concrete laterally through thin sections or on slopes, like conical manhole sections. Internal vibrators should only be inserted and withdrawn vertically as described in section 4.4.3. "Do not use vibrators to move concrete laterally," the manual says. Lateral movement of concrete with a vibrator will promote segregation.

life of both the vibrator and the formwork.

External vibrators will usually consolidate a concrete radius of about 18-inches but the exact impact will vary from case to case. This type of vibrator will impart vibratory forces on both the formwork and the concrete and will therefore consume more power than internal vibrators in order to obtain the same level of consolidation. Some precasters prefer them, however, because they require less time for consolidation compared with internal vibrators. Form vibrators are the vibrator of choice for zero-slump concrete and are often attached to the core and jacket of dry-cast forms. Dry-cast equipment may be designed to work as a system (a specific vibrator with a particular form system), so use caution when attaching a different type of vibrator to a dry-cast form. Always consult the equipment manufacturer and the vibrator supplier when making such a change.

Form vibrators should never be attached directly to the form skin. This may lead to fatigue stresses on the form in the area near the vibrator mount. Attach form vibrators to a structural stiffener in locations recommended by the form manufacturer.

### VIBRATOR SETTINGS

Whether you're using an internal or external vibrator, there is usually a weight within it called the eccentric. The movement of an unbalanced eccentric is what causes the vibration. The size of the eccentric affects two important settings of a vibrator: its frequency and amplitude.

The frequency and amplitude of the unit will impact liquefaction and consolidation. The frequency setting refers to the number of cycles the vibrator makes per unit of time, typically referred to in units of vibrations per minute. The greater the frequency, the more vibratory impacts the concrete receives. High frequency settings on vibrators primarily affect fine particles, moving sand and slurry around coarse aggregate and ultimately liquefying the mixture.

Amplitude is the unit's deviation from the point of rest. The higher the amplitude, the greater the distance the vibrator head will move and the stronger the vibratory energy imparted to the mix. Higher amplitude settings are preferred with large aggregate mixes as they move coarse aggregate and determine radiuses of influence.

The frequency of pneumatic vibrators can be adjusted easily by changing the air pressure, while some electric vibrators have adjustable frequency settings. The amplitude typically can be changed by changing the mass of the eccentric weight or head diameter of internal vibrators. The mass of the eccentric weight can also be changed in certain types of external vibrators.

Optimum frequencies and amplitudes will vary by product, mix design and form size. A consultation with plant engineering staff or the vibrator supplier will assist in determining the ideal setting for your mix design, type of form and amount of reinforcement. This is true whether you are using an internal or external vibrator.

### VIBRATION TIME

The ideal vibration time is not always a set number of minutes and seconds. It is the amount of time a vibrator needs to completely consolidate the specific mix design, in its particular formwork, with its unique reinforcement configuration.

Experience with a vibrator, the mix design and formwork is the best way to determine ideal vibration duration times at particular amplitude and frequency settings.

The length of time you vibrate the concrete should ensure the release of all entrapped air pockets but prevent the segregation of the heavier coarse aggregate particles from the paste matrix. At the start of the vibration procedure a large quantity of entrapped air bubbles can be seen escaping the concrete at the surface. As vibration continues, the rising of air pockets slows and a sheen will appear over the concrete surface. The sound of the vibrator will deepen as it densifies the fresh concrete.

The amount of time you should vibrate concrete is also affected by the vibrator type, size and settings. Consult your vibrator supplier for this information and let experience be your guide.

### SUCCESSFUL CONSOLIDATION

No two uses of concrete vibrators are exactly alike. With factors such as mix design, reinforcement configurations, vibrator type and size all coming into play, the best way to ensure a quality product is training, experience and following manufacturer guidelines. **PI**

*Alex Morales, M. Ed., is NPCA's director of workforce development.*



For step-by-step guidelines throughout the entire vibration process using internal or external vibrators, check out NPCA's Precast Learning Lab video on proper consolidation at [precast.org/learning-lab](https://precast.org/learning-lab)



# Capacity, Reach, and Versatility:

## ALL Crane Makes Quick Work of Indiana Bridge

**T**he Liebherr LTM 1750-9.1 is gaining new fans for its capacity, reach, and versatility, this time in the Hoosier State, prompted by a recent bridge project near Indiana University Northwest. Ellas Construction of Gary, Indiana, was the general contractor on the job, hiring Central Rent-A-Crane, a member of the ALL Family of Companies, to provide the 1750 for the work.

"The 1750 is the only machine that could have done this job," said Marty Zurbriggen, general manager of Ellas Construction. "We didn't have the room on the site to use a dual-pick system. A landing beam wasn't an option, either, because these bridge beams were too large for that. It had to be a single pick, and the 1750 is the only choice that is small enough to fit, with a capacity great enough to make the pick."

The Liebherr LTM 1750-9.1 has earned raves wherever it's been used due to its 900 USt capacity, 171-foot boom, and short set-up time. In this instance, it was used to pick six 117-foot precast bridge beams weighing 130,000 pounds and set them over the Little Calumet River in Gary.



"The site had limited space for setup, another reason the 1750 was ideal," said Larry Macuga, sales manager for Central Rent-A-Crane. He noted that using a crawler would have required extensive site preparation as well as adding significant time for mobilization, assembly, and disassembly. "Add to that a radius of about 100 feet, plus the bridge was skewed, meaning the beams had to be set at an angle across the river. This machine had the capacity, reach, and flexibility to get it done, and ALL Crane has two of the few on North American soil."

Beam seats were already poured and each beam had to be within a quarter-inch of tolerance. The 1750 was able to do the job in approximately nine and a half hours.

What precipitated the need for the new bridge? To prevent pervasive flooding, the Army Corps of Engineers undertook the major investment of adding a series of levies to the Little Calumet River. Unfortunately, not all bridges in the area were high enough to accommodate how high the waters can become. In flash flood situations, local fire departments are being called upon to sandbag the bridges. Building new, higher bridges over the river will eliminate the need for that, and keep roadways open, which is vital due to its proximity to the university. ■

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# Unformed Surface Imperfections

By Eric Carleton, P.E.

**Editor's Note:**  
*Last issue, Precast Inc. went in-depth on formed surface imperfections. This article will discuss unformed surface imperfections and how to prevent them.*



**W**e always aim for perfection when producing precast concrete products, but sometimes it is just out of reach. This story continues our pursuit of eliminating the causes of imperfections on the surfaces of precast concrete.

## **NEW PRODUCT LINES EQUAL MORE UNFORMED SURFACES**

Many precast products cast vertically have a limited amount of unformed surfaces. As the precast concrete industry expands to include more plant-cast flatwork – such as precast bridge deck panels, paving slabs and traditional markets such as precast steps and docks – increased knowledge of best practices to eliminate unformed surface imperfections becomes increasingly important.

For the precast producer, unformed surface issues can manifest themselves as shrinkage cracks, crazing, blistering, scaling and delamination, dusting, discoloration or low spots. Technical literature and recommended industry practices contain a common thread of recommendations to reduce the likelihood of these imperfections occurring.

Those recommendations include starting with a proper mix for both the application and environment, proper curing and careful timing when finishing. Though each item is critically important to produce the best precast product, the emphasis for this article will be placed on curing and timing.

For precasters familiar with only pouring and consolidating concrete within closed formwork, the proper finishing techniques needed for unformed surfaces to provide the strongest, most durable concrete with the desired surface texture is not necessarily intuitive.

## **LESS IS MORE**

After casting the concrete, screeding the concrete to level, and possibly an initial float to eliminate low and high spots, it is time to wait. The concrete will begin its bleeding time – the mix will have the heavier constituents settle and consolidate on their own, squeezing excess mix water up and eventually out to the surface. It is most important to discontinue finishing operations until the concrete mix has begun its initial set and bleed water has stopped appearing. In good conditions, this can be identified when the initial sheen of the water has dissipated on the concrete. However, the atmospheric conditions around the concrete surface will dictate how quickly the surface bleed water will dissipate (or evaporate), if at all.

A high ambient temperature, direct sunlight, arid or low humidity and/or windy conditions can lead to surface water evaporating faster than new bleed water can be brought to the surface. That leads to drying of the surface concrete and creates a host of potential surface issues later for the hardened concrete. This premature drying of the concrete can also give the false impression that the bleeding has stopped.

Manufacturing products within a controlled environment is a big benefit for this critical time for the concrete mix. It is important to base the wait time on more than simply bleed water appearance. A true “rule of thumb” is if a gloved thumb pressing onto the concrete surface leaves a ¼-inch indent or less, then the concrete is ready for final finishing. Similar indent rules have been used in the ready-mix industry for a foot or boot print with a ¼-inch indent.

This wait time is perfect for setting up and pouring the next form, cleaning the concrete tools, having a safety conversation, etc. However,

each precaster will need to determine the optimum wait time based on their mix and production processes and revise as needed when things change. It is a tricky optimization requiring careful thought, record keeping and training, as starting final finishing too early can create serious surface issues and starting too late will mean working with a stiffened concrete which may be difficult to finish.

## **MORE IS MORE**

Curing is another important process within the early life cycle of concrete and cannot be overemphasized. It should begin immediately after the final finishing is completed. Proper curing of precast products with unformed concrete surfaces is like that of formed surfaces with respect to temperature conditions. However, large exposed surface areas need special considerations to ensure those areas remain in a moist condition by maintaining a high-humidity environment. At this point, following the initial set and finishing, any added water to the surface is beneficial. Therefore, direct gentle water spray, water-soaked coverings, or liquid membrane curing compounds in accordance with ASTM C309, “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete,” applied topically on all the exposed surfaces are all good methods to maintain moist conditions. Additional best practices and information on concrete curing can be found within ACI 308R-16 “Guide to External Curing of Concrete.”

## **COMMON SURFACE IMPERFECTIONS: CAUSES AND SOLUTIONS**

### **Shrinkage cracks**

Shrinkage cracks can form either before or after final hardening. If they occur before final hardening, they are caused by water evaporation exceeding bleed water replenishment. Blocking wind or direct sun or providing indirect misting can help prevent these cracks. You can even use evaporation retardants.

Shrinkage cracks forming after the final hardening are often caused by concrete drying and small volumetric changes creating tensile stresses to a point of cracking. You can solve this problem by modifying cementitious materials, aggregate type and gradations and admixture use. Shrinkage-reducing admixtures may also be used.

### **Crazing**

Crazing is defined as very fine, shallow interconnected cracks (sometimes called map cracking). There are multiple causes of crazing, including high evaporation and drying rate during curing, excessive floating, finishing while concrete is bleeding or bleed water remains on the surface, adding water to the surface during finishing to wet the concrete, and adding cement to the surface to dry the concrete. The best way to prevent crazing is to properly float and finish at the proper times.

### **Blistering**

Small bumps appearing on the unformed surface of concrete during finishing is known as blistering. Blistering is caused by excess air or bleed water trapped under a concrete surface that was sealed by excessive floating or troweling, or improper use of a steel trowel. Blistering also occurs when the surface dries and out and crusts, which seals the surface. To prevent blistering, you should reduce or eliminate surface drying conditions and improve bull float and troweling processes to reduce potential surface sealing.

### **Delamination and scaling**

Delamination and scaling appear as thin layers of cement paste on the product surface that flake away from the concrete mass. The cause of these problems can be attributed to sealed concrete surfaces not allowing the release of pore water pressure – delamination early with bleed water, scaling later in service with saturated concrete and expanding frozen water under the surface. Again, properly floating and finishing at the right time is the best way to prevent these issues.

### **Dusting**

Dusting is quite simply the presence of a powdery material on the surface of concrete. It can be caused by excessive floating creating too much surface paste as well as finishing while the concrete is still bleeding. It can also be caused by carbonation when heaters blow carbon dioxide onto the concrete surface disrupting the hydration process, when water is applied at finishing or if there is rainwater exposure during finishing. By implementing correct finishing and curing processes in your plant, you can easily prevent dusting.

### **Discoloration**

Discoloration, light or dark patches and other color inconsistencies, can be caused by delayed or early finishing, changes in finishing practices, the presence of calcium chloride in the mix and even if plastic sheeting comes in contact with the concrete during curing. Keep mix designs the same for all the respective castings and ensure the finish

wait time is based on concrete set time and not just bleed water to prevent discoloration.

### **Low spots**

Low spots in your concrete can be caused by an inadequate amount of concrete placed in the form or even poor form setup. This is a problem that can easily be prevented by checking your form setups for grade and level and verifying your concrete pour for complete form filling. You should always check and verify that there are no open areas under the screed during strike off. It could even be as simple as using a wider float tool or increasing plant area lighting to better view concrete surfaces for smooth level surfaces free of variability.

### **ATTAINING EXCELLENCE**

Concrete has shown through thousands of years of use to be a perfect building material. However, it takes knowledge, skill and care to mix, cast, cure and deliver the best precast concrete product free of surface imperfections. Regardless of the product application, a precast concrete company's name and reputation is based on the appearance of each product on a truck or job site for public view. Though absolute perfection may not be attainable, excellence is within all our grasps. **PI**

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



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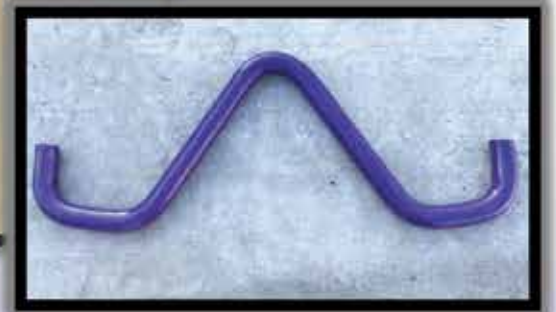
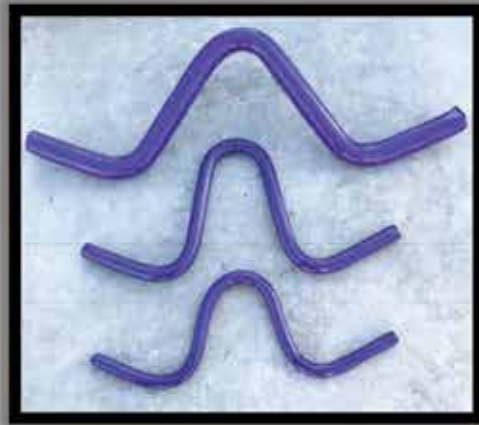


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# What Precasters Need to Know about High-Strength Wastewater

By Dr. Sara Heger, University of Minnesota

High-strength wastewater has been identified as a cause of early failure of on-site sewage treatment systems. With a large variation in failure types, it's important for precast concrete manufacturers to know what causes these issues and what options are available to solve them.

**W**hat is high-strength wastewater? High-strength wastewater (HSW) can be defined in different ways based on the jurisdiction. The accepted national definition, according to the Consortium of Institutes for Decentralized Wastewater Treatment Decentralized Wastewater Glossary, is a biochemical oxygen demand (BOD<sub>5</sub>) less than or equal to 170 mg/L, total suspended solids (TSS) less than or equal to 60 mg/L, and oil and greases (O&G) less than or equal to 25 mg/L.

That being said, there is a large variation in types of HSW. It is helpful to consider this range when evaluating treatment options:

1. **Light HSW** – Facilities with mostly toilet flushing tend to have elevated BOD<sub>5</sub> and TSS (~2-3 times residential)
2. **Medium HSW** – Facilities that have commercial kitchens have elevated BOD<sub>5</sub>, TSS and O&G (~4-10 times residential)
3. **High HSW** – Industrial facilities with very high loads of BOD<sub>5</sub>, TSS and possibly O&G (10+ times residential)

The additional challenge with many commercial facilities can be their higher-than-normal use of cleaners and chemicals, which can negatively impact the needed microorganism in the treatment system.

When it comes to designing septic systems, often the first item brought up is how many gallons per day (GPD) the system is going to handle. However, for commercial systems, the organic loading rate is often more critical than the GPD. A one-size-fits-all approach does not work as the treatment starts in the facility, such as a restaurant, supermarket or slaughterhouse.

Wastewater from commercial facilities tends to contain more contaminants that need treatment than wastewater from residential sources. If excessive organic material or solids reach the soil treatment system, the biological clogging mat can become restrictive to the point of hydraulic failure. In addition, excessive O&G can clog pipes and the soil treatment system.

In septic systems, which are biological treatment systems, the bacteria uses available oxygen in the influent to consume the organic material. A lab test can be done to determine the BOD<sub>5</sub>. Whenever possible, the system should be sampled for the BOD<sub>5</sub> along with the TSS and O&G if the HSW source includes food preparation or animal processing. If sampling is not an option, then data from similar facilities should be obtained. This information can be used along with the GPD to determine the overall organic load of the system.



## TREATMENT OPTIONS FOR HSW

**Grease traps/interceptors** are useful for HSW with high levels of O&G, including those that are food- or animal-processing related. Kitchen facilities should have and maintain a grease interceptor. Secondly, whenever possible, the external grease traps should collect only the kitchen wastewater and discharge to the downstream septic tanks, whereas the toilet and other wastewater should discharge directly into the septic tank. A cleanout outside the structure should be designed on the building sewer for line cleaning.

It is recommended to keep the building sewer short to limit the wastewater cooling and grease solidifying in the pipe. If fat and grease amounts are excessive, more and smaller tanks are better for cooling as there is more surface area contact with the cool soil surrounding many smaller tanks than one large one. A minimum of 24 hours of retention should be provided with 2-4 days recommended, particularly with high-temperature dishwashers, to assist with cooling and fat solidification (MPCA, 2013).<sup>i</sup>

The presence of a grease trap does not guarantee success if deep fryers are emptied into the drains, or if excessive disinfectants are used in the facility. The grease from fryers should be handled through a grease recycling program. Degreasers also should not be disposed of in the grease trap or septic tank as they can cause emulsification of the tanks and allow grease to move downstream into the treatment system. Undersized grease traps with inadequate detention capacity are of limited value in removing O&G as well.

Recent developments in micro-processor-based ultrasonic technology can assist in continuous monitoring of grease, sludge, liquid level and temperature in tanks and alert the owner when it is time to pump the tank. Even with automatic monitoring systems in place, owner awareness, managed maintenance and regulatory oversight are important to ensure the future of improved wastewater treatment and the environment.

Septic tanks for commercial applications should have increased hydraulic retention times. For example, Minnesota recommends at least four days of design hydraulic retention time for commercial applications. (MPCA, 2016).<sup>ii</sup> The septic tank provides anaerobic treatment (no free oxygen) of the influent. More retention time is likely needed for systems with grinder pumps or with large amounts of fats, oils and grease, dairy, alcohol or blood. Tank sizing also needs to consider the frequency of solids removal and the size of available pump trucks.

Septic tanks set in series are preferable to double-compartment tanks if temperature regulation is an issue. Effluent filters should be used on the final tank in series unless the system is going into a secondary treatment unit. The effluent screen should be rated for the flow and organic loading and have an automated alarm to indicate if the filter







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needs cleaning. Secured risers or hatches to the surface are required to service the tanks and effluent filter.

**Flow equalization/pump tanks** use a larger dosing tank and include an adjustable timer that controls pump rest intervals and run time for specific dosing regimens. In commercial systems, they should be considered when effluent is pumped from one system component to another. Flow equalization is a management concept that can help reduce stress on system performance due to high peak flows. In flow equalization, the peak flows are stored so they can be delivered uniformly over an extended period of time. Usually the flow for one day is equalized over a 24-hour period, but it can be done for longer, especially if peak flows last for longer than one full day. For this to be accomplished, the tank must be large enough to handle these flows, and the pump operation must be controlled by a timer as opposed to a float.

**Secondary treatment units** are often needed to deal with HSW. The secondary treatment is designed to provide an aerobic environment (with free oxygen). It is wise to use technologies with documented success with similar wastewater streams. Following the grease trap and/or septic tanks, the secondary treatment is used to reduce the wastewater's oxygen demand at the soil treatment area to levels at or below residential strength.

A **recirculating media filter (RMF)** is a secondary treatment device designed to passively supply oxygen in a watertight structure containing a media. For HSW, an RMF typically uses coarse sand or gravel, foam or textile media. They are generally used on light HSW facilities because if the organic loading gets too high it may plug the media. Recirculation



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mixes the effluent that has passed through the filter with septic tank effluent to dilute the wastewater strength. The RMF must still treat the overall loading from the system. They can be constructed in tanks or in lined excavations or be manufactured in watertight containers. They are required to have an additional recirculation pump tank with a timer that contains the mixture of effluent dosed to the filter.

**Aerobic treatment units (ATU)** pretreat effluent by actively adding air to break down organic matter, reduce pathogens, and transform nutrients in what is known as the activated sludge treatment process. Naturally occurring microorganisms consume the organic material in sewage. Effluent treatment in an ATU is different from that in standard septic tanks, both in the speed and quality of treatment. Bacteria in an ATU use oxygen to break down organic matter efficiently, achieving relatively quick decomposition of organic solids and reducing the concentration of pathogens in the effluent. They are typically installed in a tank and have a blower, compressor or aspirator providing air to the system. There are varying sizes and configurations. Aerobic treatment units can be designed to handle light-to-high HSW and can successfully reduce BOD<sub>5</sub>, TSS and O&G to concentrations similar to residential waste strength or even cleaner.

### CHOOSING THE RIGHT SYSTEM

Dealing with HSW requires careful analysis of the facility and, more importantly, the waste characteristics such as the organic loading rate. Designing an HSW system based only on flow rates can lead to issues

downstream. When a precast tank supplier is approached to design tanks for an HSW system, they should:

1. Request design flow
2. Request the waste source
3. Inquire if samples for BOD<sub>5</sub>, TSS and FOG can be obtained from an existing facility or if data is available from a similar facility
4. Assist designer/engineering in determining the grease interceptor and septic tank sizing to reduce the loading to downstream components
5. Suggest that with some waste streams, tanks alone will not be sufficient pretreatment prior to sending it to the soil distribution field and additional treatment steps may be needed.

Additional resources are available that offer some guidance from the Consortium of Institutes for Decentralized Wastewater Treatment<sup>1,2</sup> and the Minnesota Pollution Control Agency.<sup>3</sup> **PI**

#### REFERENCES:

- i Subsurface Sewage Treatment System Standards: Chapter 7080 - 7083 MN Rules. Minnesota Pollution Control Agency, Water Quality Div., St. Paul, MN.
- ii Subsurface Sewage Treatment System Standards: Chapter 7080 - 7083 MN Rules. Minnesota Pollution Control Agency, Water Quality Div., St. Paul, MN.

#### RESOURCES:

- 1 <http://www.onsiteconsortium.org/awtschecklists.html>
- 2 <http://www.onsiteconsortium.org/shop.html#awts>
- 3 Subsurface Sewage Treatment System Standards: Chapter 7080 - 7083 MN Rules. Minnesota Pollution Control Agency, Water Quality Div., St. Paul, MN.

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# Steel Reinforcement

## BEST PRACTICES

By Kayla Hanson

Concrete is an inherently strong, durable and resilient material; however, its most impressive strength is displayed in compression. Its strength in tension tends to be only 10% of what it's capable of enduring in pure compression. Conversely, steel exhibits incredible strength in tension and limited strength in compression. When these materials are used together strategically, each of their greatest strengths are activated, and the result is a uniquely capable and exceedingly strong construction material: reinforced concrete.

As with any design and manufacturing process, care must be taken throughout material procurement, storage and fabrication to optimize the benefits of concrete and steel together.

### MATERIAL PROCUREMENT

Whether your plant uses traditional black bar, epoxy-coated

reinforcement, welded wire fabric or mesh, or other types of reinforcement, start by ensuring the reinforcement mill certificate for each shipment shows the material complies with the applicable ASTM standard. The most commonly referenced reinforcement standards in precast are:

- ▶ **ASTM A615**, "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement"
- ▶ **ASTM A706**, "Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement"
- ▶ **ASTM A775**, "Specification for Epoxy-Coated Steel Reinforcing Bars"
- ▶ **ASTM A1064**, "Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete"



These standards ensure a consistent quality reinforcement material is used in your reinforced concrete products. For those projects complying to the Buy American Act, it is also very important the steel reinforcing documentation received clearly shows the country of origin.

## STORAGE

### Protect against contaminants

The bond between reinforcement and the surrounding concrete is critical to the reinforced concrete product's performance and the steel's ability to "activate" when necessary. Compromised bond between the two materials will prevent the structure from behaving as designed.

Regardless of the type of reinforcement, time of year or storage location, all reinforcement must be stored elevated from the ground, preferably in racks or on dunnage that sufficiently supports the reinforcement and prevents it from bowing considerably. When reinforcement contacts the ground, contaminants such as dust, dirt and oil can cling to the reinforcement's surface and reduce its ability to bond with concrete. Refer to the Precast Inc. article "Bond, Reinforcement Bond" for more information.<sup>1</sup>

### Protect against the elements

If the plant layout allows, consider storing reinforcement indoors or under cover to help protect it from the elements. Limiting the amount of exposure to sun, rain, snow, ice and temperature fluctuations will reduce the amount of weathering and oxidation the steel will experience prior to use. Epoxy-coated reinforcement is particularly susceptible to degradation and must be stored indoors or under a tarp or other means to provide protection from the sun's ultraviolet rays, no matter the time of year.

### Know acceptable levels of oxidation

Some reinforcement may be shipped from the supplier with minor spots of oxidation. Rough or irregular steel surfaces can enhance bond with concrete, so minor oxidation can actually benefit bond strength. However, if reinforcement shows signs of rusting to the point that the bar's cross-sectional area is impacted even slightly, the reinforcement must not be used.

### Ensure easy identification

All reinforcement supplies – whether bundles, mats or coils – must always be easily identifiable for as long as you have the material. The identification tag affixed to the shipment which shows the supplier name, steel grade, dimensions and/or bar size, heat number and other information must remain attached to the supply until the last piece is used.

## FABRICATION

### Know the governing tolerances

All reinforcement must be fabricated in accordance with a detailed steel plan document, which must also show the steel dimensional tolerances, including length and spacing allowances. Certain ASTM standards as well as ACI 318, "Building Code Requirements for Reinforced Concrete," outline product-specific tolerances. However, some projects or jurisdictions will specify different tolerances, so it is imperative the project documents clearly indicate the governing tolerance scheme.



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### Approve any variation

Any reinforcement substitution or variation from the detailed steel plan documents – in bar size, number of bars, steel grade, bar spacing, splice type, etc. – must be reviewed and approved by the appropriate plant personnel. Using a larger size bar or decreasing the spacing between bars does not always correspond to a stronger structure, so even the slightest variation or minor substitution must be approved before proceeding with the change.

### Measure twice, cut and bend once

Use care when measuring, cutting and bending reinforcement to ensure accuracy. Bending or straightening reinforcement in extremely cold weather typically requires preheating of the bars to prevent cracking or brittle breakage. Most bars can be cut to size with an oxy-acetylene

torch or even a bolt cutter. Epoxy-coated bars should be cut using a saw with a diamond-tip blade instead of being flame-cut.

Using reinforcement templates or jigs for frequently used or standard designs can help expedite the reinforcement cutting, layout and assembly process while also reducing possibilities for human error.

All reinforcement shall be bent in accordance with standard CRSI and RSIC/IAAC fabrication practices. Give special attention to the minimum bend diameters and hook dimensions associated with different bar sizes, lengths and steel types which are set forth by CRSI and RSIC/IAAC and reference ACI 318.<sup>ii</sup> Care should be given to the bending process to ensure the necessary bend is achieved on the first attempt rather than trying to re-bend the bar to the correct radius, since bending the bar back and forth multiple times can reduce its integrity.

If the design, project specifications or detailed reinforcing steel plans require a bend in reinforcing steel around a corner, substitution of straight sections tied or welded together is not an acceptable practice.

### Ensure a rigid assembly

Reinforcement cages, bar mats and other configurations must be fabricated into rigid assemblies, meaning they will retain their shape, dimensions, spacing and integrity during handling, transport, positioning in the form and during concrete placement. Rigid assemblies are achieved by tying with wires, clipping with plastic clips or welding when

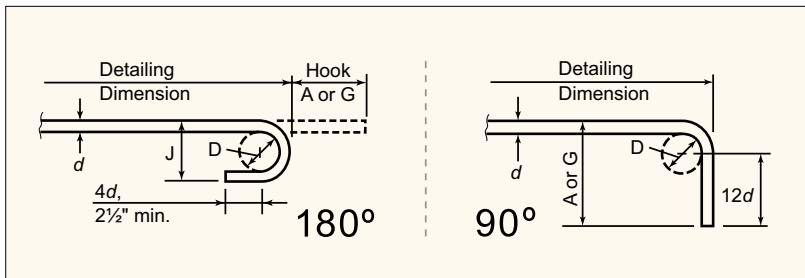


Figure 1: CRSI standard hook and bend details in accordance with ACI 318.



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allowed. Liberal use of tie wires, clips and welds is recommended. When using wire ties to assemble epoxy-coated reinforcement, ensure only epoxy-coated tie wires are used.

### Weld wisely

Generally, ASTM A615-compliant reinforcement is considered non-weldable unless carbon equivalence calculations are performed to determine the appropriateness of welding. So long as the carbon equivalence content falls within the target range set forth by American Welding Society D1.4, “Structural Welding Code – Steel Reinforcing Bars,” the bars may be welded. If the carbon equivalent falls outside of the target range, the bars may still be welded if the reinforcement is pre-heated adequately. Review Section 4.2.2 of the NPCA Quality Control Manual for guidelines, applicable equations and target ranges.

## Plain or Deformed Steel Reinforcement?

**Plain steel** reinforcement has a smooth surface and a cylindrical cross section. It is most often seen when using welded wire fabric. The steel is perfectly smooth and bonds to the concrete at the welded intersections.

To increase bond, some welded wire fabric is purposefully **deformed**, or nicked, along the surface of the steel to create additional rough areas.

Most rebar used in the precast concrete industry is deformed, although not necessarily nicked like **WWF**. The ridges along rebar are called deformations and create valleys into which fresh concrete can consolidate and harden. The primary purpose of these deformations is to improve the bond between steel and concrete.

ASTM A706-compliant reinforcement is considered weldable without performing carbon equivalent calculations. It is less brittle as a result of its lower carbon content, and therefore considered acceptable for welding.

Additionally, reinforcement that will be welded in temperatures less than 32 F should be allowed to reach 70 F prior to and during welding. When welding any type of reinforcement, be careful not to burn through the reinforcement or cause undercutting, which compromises the steel’s integrity and reduces the steel’s cross-sectional area. Refer to the Precast Inc. article “Practice What You Preach: Tips for Welding Rebar” for more information.<sup>iii</sup>

ASTM A775-compliant epoxy-coated reinforcement may also be welded, however this requires particular attention to detail to ensure a solid weld and adequate repair to the epoxy coating. Refer to the Precast Inc. article “Working with Epoxy-Coated Rebar” for further information.<sup>iv</sup>

### Follow lap splice guidelines

Lap splices allow two lengths of reinforcement or two ends of welded wire reinforcement to be joined with the intent of acting as one continuous section of reinforcement. Minimum lap splice lengths are dictated by ACI 318 and depend on the concrete strength, steel grade, reinforcement bar size and spacing. Particular care is needed to ensure spliced reinforcement behaves as designed. Refer to CRSI’s Introduction to Steel Reinforcing Bar Splices for more information.<sup>v</sup>

### Repair damage and watch for warning signs

Any damaged locations on epoxy-coated reinforcement must be repaired with an appropriate patching material in a manner conforming to the patching material manufacturer’s recommendations. When epoxy-coated reinforcement is cut or welded, repairs must be made to both the cut ends and to the compromised epoxy coating near the weld.

When bending bars, be mindful of the steel temperature as well as the ambient temperature. Watch for small cracks in the steel at the bend radius and discard any compromised reinforcement.



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Now is the time to review reinforcement best practices in your plant. **PI**

*Kayla Hanson is NPCA's director of technical services.*

### REFERENCES:

- i <https://precast.org/2017/07/bond-reinforcement-bond/?fs=reinforcement%20bond>
- ii [http://resources.crsi.org/index.cfm/\\_api/render/file/?method=inline&fileID=2CF0D551-FF69-58F7-140FBB7FB75FED71](http://resources.crsi.org/index.cfm/_api/render/file/?method=inline&fileID=2CF0D551-FF69-58F7-140FBB7FB75FED71)
- iii <https://precast.org/2017/09/practice-preach-tips-welding-rebar/?fs=weld%20rebar>
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Check out NPCA's Learning Lab videos for "Reinforcement Fabrication" and "Reinforcement Inspection" at [precast.org/learning-lab](https://precast.org/learning-lab)



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# THE LONG & WINDING ROAD

Culture and a “Can-do” Spirit Keep  
**Terre Hill Concrete Products** on the  
Path to Success.

By Bob Whitmore

**G**ene Martin calls it a long and winding road. The road started 100 years ago in the bucolic borough of Terre Hill, Pa., when Gene’s grandfather, Adam H. Martin, bought a small form to make concrete blocks.

He mixed up some concrete in a wheelbarrow and started the laborious process of making blocks – one by one – that he could sell to homebuilders, masons or anybody else who needed them. Put a little mud in the form, tamp it down, add another layer. Repeat. Repeat. Repeat. And voila, after about 5 or 6 minutes of tamping and clamping, you had a block.

“I’m not sure what the impetus was in deciding to get into the block business other than he needed to make a living,” Gene said. “He had a large family and needed to support them.”

Adam churned out the blocks, day after day. Then in 1927, the road took a turn when Adam brought in his brother Benjamin. They began building silos for southeastern Pennsylvania farmers and soon incorporated their growing business as Terre Hill Silo Co. While the road has since turned away from silos, Terre Hill Concrete Products has





evolved into a regional powerhouse precast and block company, now heading into its second century and fourth generation.

## DEEP HISTORY

Located about an hour west of Philadelphia, Terre Hill is one of the smallest boroughs in Lancaster County. In fact, the borough is so small that if an out-of-towner says he's looking for Terre Hill, most people assume they're looking for the concrete and block plant. It's a community of about 1,200 citizens with no traffic lights. It's tiny, but surrounded by dozens of other boroughs, townships and unincorporated communities built around the rolling hills, green pastures and scenic vistas on the fringe of the Appalachian Mountains.

It is a place of deep history that pre-dates the American Revolution. So, it is fitting the Martin family that operates Terre Hill is on its fourth generation. Founded by Adam Martin, expanded by second-generation president Adam Eugene Martin (known as Eugene) and continuing its upward mobility under the leadership of brothers Adam Eugene Jr. (known as Gene) and Nelson Martin, the company heads into its second century with three members of the fourth generation firmly in place.

Though Terre Hill has likely evolved far beyond what Adam Martin could have imagined, the company's legacy has not been forgotten. Terre Hill's long and winding road has branched off in new and innovative ways, but its culture was established decades ago and continues today. It is spelled out in the company's "road map" that is imparted to new employees, published on its website and ingrained in longtime Terre Hill staff.



## HARD WORK, HIGH QUALITY

The folks who settled southeastern Pennsylvania are known for hard work and high-quality products. Embedded among them is the world's largest community of Amish. Surrounded by this culture and mindset, Terre Hill has grown and prospered since its inception in 1919. While the Amish culture has changed little in the past century, Terre Hill has evolved.

As second-generation Eugene Martin grew the block business and looked around for new opportunities, one thing remained consistent – his need for hard working, talented, and loyal employees.

"Dad had a philosophy," his son, Nelson, said. "If I can hire somebody who came off a farm, I'm going to. Because they have a work ethic.

"They know what long hours are. They're not afraid of it."

And while there are few former farm workers available for hire these days, the culture of getting the job done is ingrained in the company's more than 170 employees across four plants.

"A company is only as good as its people," said Gene, "and we have been blessed, from our very beginnings, with many great people. Without our people, we would not have the success and longevity that we have had as a company. Reaching our 100-year anniversary is really a tribute to the people who have served, and continue to serve, this company."

The many long-term, committed employees are a great source of pride to the entire management team. Many have spent their entire professional careers working for the company, helping to sustain and grow its success.

Fourth generation family member Adam Eugene Martin III (known as Adam), the company's current safety manager, said it comes down to taking responsibility. He learned it from his father, Gene, and uncle, Nelson. They learned it from their father, and it has been passed on to longtime employees as well.

"I look at our people who've been here for a while, and it's like this: if something needs to get done, who can be the first to raise their hand and jump on it – even if it's not their responsibility or not in their job title?" Adam said. "I think it's one way we separate ourselves from the competition."

Terre Hill Concrete Products was founded 100 years ago by Adam H. Martin in Terre Hill, Pa. What started as a small concrete block business has grown to four plants and more than 170 employees.



“We’re afraid the ghost of grandpa is going to come back and get us if we don’t,” Gene said, chuckling.

### TOTAL AUTOMATION

Mechanization has exploded Terre Hill’s capacity to produce blocks over the years. From the original 50-per-day, hand-tamped blocks, the company now can crank out 20,000 or more, depending on demand. The original plant, known as Plant #1, is equipped with a Stearns 3-at-a-time block machine, while Plant #3, which came online in 1980, contains a fully automated 6-at-a-time Besser system that tripled the company’s capacity.

“The blocks are molded, cured, and cubed automatically,” Gene said. “When our guy grabs them with a lift truck to move them out to the

yard, that’s the first time the blocks are touched, so there’s no human intervention whatsoever. What you see is 100% automated, from the handling of all the raw materials, the mixing, batching, conveying, block-making – to the kilns and out to the cubers – everything. Total automation.”

But that’s only part of the story. In the 1960s, with a solid block business going, Eugene Martin was interested in branching out and took another turn in the road by getting into the precast concrete business.

“My dad, sometime in the ‘60s, saw the upcoming precast market,” Gene said. “Like many precasters, he started doing things like septic tanks, and since they were in the silo business, he also started making agricultural products like feed bunkers and things they would sell to farmers. And that developed into doing sanitary manholes and then

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**INTEGRITY** – Conducting ourselves ethically, honestly, and authentically

**INGENUITY** – Meeting challenges with enthusiasm and developing creative solutions

**STEWARDSHIP** – Caring for our people with genuine concern and managing our resources wisely

**SERVICE** – Focusing on the greater good in order to place the needs of others ahead of our own



NECA file photo



Photo by Kristi Fisher



Photo by Kristal Fisher

drainage products – inlets and catch basins and those kinds of products,” Gene added.

That success led Eugene to construct Plant #2 in 1969 to grow the precast side of the business.

“He made a very significant investment to really get into the precast business well beyond just manufacturing septic tanks and that type of thing,” Gene said. “My dad was a very intuitive guy. He had an entrepreneurial spirit and was always looking for the next best thing.”

### DRESSED FOR SUCCESS

While Adam Martin, the founder, was a straight-up, hard-working guy, his son Eugene was more of a visionary. He always wore a dress shirt, tie and jacket to work.

“Dressed for success,” Gene said of his father. “But he was still a laborer at heart. In the trunk of his car was a pair of Tingley rubber boots and full coveralls that he would put on.

“He would show up at the plant at any time and he’d have his coat and tie on, and he’d take off his jacket, leave his tie on and dress in his coveralls and Tingley boots. If something was going on at the job site, he would never go out there and just stand and watch. He had to be engaged in everything. All portions of it.”

With two block plants and a precast plant, Terre Hill was firmly established, but there was more opportunity. In 1987, they opened Plant #4, 28 miles west of their original site, in neighboring Lebanon County. They found a steel plant that had gone out of business, acquired a few universal forms and made a deal with a local ready-mix producer to supply the concrete. They needed employees, so Gene and Nelson went to a job fair.

“We hired eight guys on the spot,” Gene said. “It was like, ‘Show up for work Monday, we’re starting a precast plant.’”

That plant became one of Nelson’s key projects, and it grew over the years into Terre Hill’s heavy highway production facility.

Third and fourth generation descendants of Adam H. Martin currently working at THCP include (L-R) Joshua Martin (Director of Business Improvement), Dave Martin (Precast Engineering Manager), Nelson Martin (Vice-President of Operations), Adam Martin (Corporate Safety Manager), Gene Martin (President), and Michelle Martin Custer (Director of Human Resources).

“We do all different kinds of bridge structures,” Gene said. “We are a manufacturer for Contech and their proprietary product CON/SPAN, so we do a lot of CON/SPAN work. And then after we get past box culverts we do arch culverts – up to 60-foot clear-span.”

Terre Hill has also patented the technology for three proprietary stormwater systems that are mainly produced at Plant #4 – Terre Arch, Terre Box, and Terre Kleen.

“Because of our location in the southeast corner of Pennsylvania, within 50 miles we can be in New Jersey, we can be in Maryland, we can be in Delaware,” Gene said. “We do DOT work in all those states as well as some in West Virginia and an occasional job in Virginia.”

In addition to extensive bridge work, Terre Hill has carved out a niche in airport infrastructure, marine terminals and other specialty projects. Its engineering department is critical in this phase of the business.

“We’ve got a good group of engineers and draftspeople,” Gene said. “We try to take work that is otherwise designed as cast-in-place and convert it to precast. We like to think that our only limitation is, ‘Can you truck it?’”

Terre Hill’s regional visibility as a can-do precaster has drawn some unique jobs over the years, including one of which they are most proud: supplying the Terre Kleen system, their hydrodynamic separator for



Photo by Kristal Fisher



Terre Hill manufactured its licensed stormwater system, Terre Kleen, for a project at the World Trade Center Transportation Hub.



pre-treatment of stormwater, to the World Trade Center rebuilding in New York City. The smaller footprint of the Terre Kleen system, due to its unique design, made it the only system of its type that would fit into the available space at the site.

### FOURTH GENERATION STEPPING UP

While the third generation of the Martin family – brothers Gene, Nelson and Dave – will not be retiring any time soon, the fourth generation is stepping into leadership roles and

helping the company adapt to a changing workforce with a plan to continue the legacy well into the 21st century. Nelson's son Joshua serves as the company's director of business improvement, which includes overseeing the IT functions and managing the company's Titan platform. It was the Titan II Precast Management System that actually brought Joshua to Terre Hill shortly after he graduated from college.

"Uncle Gene called me," Joshua said. "They wanted to computerize basically everything, and he asked me if I would help convert the office operations to Titan. I said 'Sure, I'll do it for a year,' and I was here for 11 years."

Joshua added HR to his responsibilities in 2011, left in 2016 when he was recruited by another company, and then returned 18 months later.

During that time, Gene's daughter, Michelle Custer, stepped into the HR role. Like most family members, Michelle grew up working at the plant while she was in school, but she was more interested in teaching. She taught English for 18 years at Garden Spot High School in New Holland, Pa., then took a sabbatical when her sister, Liz, was battling terminal cancer. It was a traumatic time for the entire family, and afterwards, Michelle was not ready to return to the classroom. The HR director's position – and being close to family – may have been just the right fit.

Joshua and Michelle now work closely on employee development, recruiting and operational issues.

Gene's son Adam serves as safety manager, but like everybody else, wears other hats too. Like Gene and Nelson, he has been with Terre Hill since he was a kid cleaning up the yard on Saturdays and biding his time until he could get into the plant as a production worker.

## TERRE HILL BY THE NUMBERS

100  
YEARS IN BUSINESS

173  
EMPLOYEES

4  
PLANTS  
(2 block, 2 precast)

6  
FAMILY MEMBERS  
*currently involved in the business*

20,000+  
MAX CONCRETE BLOCKS  
*produced per day*

5  
PATENTED PRODUCTS



“This is the only job I’ve ever had,” Adam said. “Every summer and during college breaks, I was at home working at the plant, wherever we needed help. I’ve pretty much worked in every department at all our plants.”

After Adam graduated from West Chester University, Gene and Nelson offered him the safety manager’s position.

“My attitude was, I’ll do whatever the company needs,” he said. “I really like it now. Safety as a company has come a long way, so we’re really happy about that, but I still like to get out and work on the road and in the plants occasionally.”

While Joshua and Michelle have been keeping Terre Hill on the leading edge operationally, Adam has brought a more modern approach to the plant floor.

“Adam has a unique relationship with the employees,” Gene said. “Some of our directors in the past were a little hardcore – pounding the safety stuff down people’s throat, and I’m not sure that’s the most productive way to run a safety program. We’ve found that it’s a lot more successful when your employees know that you are genuinely concerned about them and not just worried about dotting all the i’s and crossing all the t’s to comply with OSHA standards.

“We’re concerned that everybody goes home safe at the end of the day, and actually last year we had zero reportable incidents at both of our precast plants, so we’re proud of where Adam has taken us.”

That focus on employees is present in the office as well as on the plant floor. Michelle’s time as a high school teacher has given her insights into young people and connections in the community that can help with recruiting new employees.

“A lot of what I did for 18 years as a teacher has really translated well into my role in HR,” she said. “Josh and I have really put a focus on developing our employees. We created a curriculum called THCPU (Terre Hill Concrete Products University).

“We did our first round last fall where we asked for volunteers – current employees who are either in leadership roles or want to eventually be in leadership roles. We took them through leadership training. I thought it went well and was well received by our inaugural group of employees.”

Like all manufacturers today, finding labor is the key challenge.

“It can be frustrating,” Michelle said, “but it can also be really rewarding. When you find the right person and the right fit and they’re engaged and growing as an employee, that’s a rewarding thing to see.”

### CONTINUING THE MOMENTUM

While the second and third generations have built Terre Hill into a highly respected Mid-Atlantic precast and block producer, the fourth generation is invested in ensuring the momentum continues into the second century.

“When you’ve been in business 100 years, obviously there’s going to be a lot of, ‘Well that’s the way we’ve always done it,’” Joshua said. “And so my job is to really challenge people’s thinking and to challenge the status quo. People don’t always like it when I have ideas because it means change, and that’s uncomfortable, but it’s one of the keys to the next 100 years – to not be complacent with the way we’ve always done it, but to look at how we can do things smarter, more efficiently, how we can use technology to our benefit.”

Joshua’s dad, Nelson, nodded in agreement.

“That’s one of the things that has separated Terre Hill Concrete

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Terre Hill has four plants in the southeast corner of Pennsylvania. The company manufactures a variety of precast concrete products from bridge structures to airport infrastructure and more.



Photo by Kelli Fisher

Products from the other precasters in our immediate area,” Nelson said. “We are always looking for new and better, different and innovative ideas. That’s something dad taught us.

“What’s out there? How can you do it differently? How can you do it better? In essence, Joshua’s position is a continuation of that theme.”

Founder Adam Martin’s work ethic was passed to his son, Eugene, who added vision and entrepreneurial flair that was passed along to the next generation. Gene now spends most of his time in the office, “steering the ship,” as Joshua says. Nelson is the guy who arrives at 5 a.m. every day before the production shift starts and makes sure the operation is running smoothly. He’ll be out on the plant floor or at an installation site if needed, just like his dad (only without the tie, coveralls and Tingley boots).

Adam trends more after Nelson and enjoys the hands-on nature of manufacturing, while Joshua and Michelle are continually working on ways to make Terre Hill a great place to work.

From one guy pounding out 50 blocks a day in 1919, Terre Hill has evolved to the point where the principals no longer have to physically labor from sunup to sundown.

“I can go home at the end of the day and not feel like I’m totally wasted,” Gene said.

And when he thinks about the long and winding road that leads to today’s Terre Hill Concrete Products, he remembers the company founder and says, “Thank you grandpa. You’ve given us a pretty good life.”

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Photo courtesy of Tricon Precast

# Bringing Your Business Processes into the 21st Century

Precast concrete manufacturers can implement technology to streamline their operations, save time and improve efficiencies across the entire organization.

By Bridget McCrea

**A**s a third-generation precaster, Chad Nance understands the nuances of running a family-owned business. On one hand, these companies have relied on established traditions and time-tested strategies to drive their success for decades. On the other, steering these organizations in new directions – or getting them to test out new processes or ideas – can sometimes be a major undertaking.

“I grew up in this business, so I’m always hearing things like, ‘Well, we’ve done it this way forever and it works,’” said Nance, vice president of operations at Nance Precast in Piedmont, Okla.

Knowing that redirecting an established, family-run entity isn’t always easy, Nance said his family business’ third generation of ownership has been looking at how to do things easier – versus just coming in and trying to change everything.

Nance is thankful the owners who came before him are usually open to change, and seriously willing to help improve their operations, back-office functions, and other areas with the help of technology, automation and digitization.

“We’re looking to incrementally change over time,” he said, “with most of those shifts taking place by simply looking at things through a different lens.”

Like many manufacturers, for example, Nance Precast relied heavily on paper from the moment an order arrived until the products were shipped to the customer – and every step in between. Not only were these manual processes time-consuming, but the company’s technology systems didn’t “talk” to one another, creating inefficiencies across the organization.

“We were going through a lot of paper and trying to go digital by using several different software programs,” Nance recalled.

To solve the problem, the company invested in an enterprise resource planning (ERP) system that ties together many of its back-office processes and extends right out onto the plant floor. Along with saving paper and reducing waste, the precaster has decreased the number of errors on its paperwork, improved its efficiency levels and streamlined its quote-to-order process.

“We’re probably three times as efficient as we were in the front office,” said Nance, who remembers a time when employees spent time tracking down quotes, orders and other documents for delivery to the production department.

“With technology that’s available on the market now, we handle everything from quote to invoice to customer receipt automatically via email and all in one shot, with a minimal number of systems.”

## LEVERAGING TECHNOLOGY

As digitization continues to make its way into every corner of the business world, manufacturers aren’t immune to the trend. Driven by changing customer expectations, the accelerated pace of innovation and the need to adapt quickly or risk being left behind, precast concrete producers are using technology to boost productivity, speed up projects, create consistent processes and meet deadlines.

“Whenever you push manufacturing in the direction of being a more automated process, you wind up with real

opportunities to reduce the overall costs of your operations,” said Aaron Allbrook, CTO at Austin-based Internet of Things software company ClearBlade, Inc.

Federal regulations and safety requirements are also pushing more manufacturers to leverage technology, particularly when it comes to creating audit trails and proof that certain steps were taken or procedures followed.

With about 100 employees to supervise at any given time, Tricon Precast’s plant managers don’t have the time to monitor their workers as they clock in and out for the day. They also don’t have time to shuffle through handwritten time sheets, but that’s exactly what they were being asked to do up until a few years ago.

“Our supervisors are working on pours, trying to make their production numbers, and handling any other number of daily responsibilities,” said Thomas Kilgore, IT director for the Houston-based precast manufacturer. “They were having employees write their times down on a sheet of paper, which was basically a handwritten log that was then sent to other departments for review and processing.”

The company was also grappling with its fair share of “buddy punching,” whereby employees would clock in or out for one another – a phenomenon that it effectively addressed by installing biometric hand scanners in its buildings.

Today, as soon as employees suit up in their personal protective equipment, they punch in a 4-digit PIN, scan their hands and are automatically clocked in for work. The same process works in reverse when employees leave for the day. This has not only cut down on the amount of paperwork that Tricon Precast’s supervisors and HR professionals have to manage on a daily basis, but it has also eradicated any cheating of the time clock.

**“With technology that’s available on the market now, we handle everything from quote to invoice to customer receipt automatically via email and all in one shot, with a minimal number of systems.”**

– Chad Nance, *Nance Precast*

## FROM MANUAL TO AUTOMATED

Tricon Precast’s commitment to using technology doesn’t end with its biometric hand scanners. The company also uses the Titan II Precast Management System, which combines administrative and management processes into a single software package. Before implementing the platform, the company was using Excel spreadsheets, handwritten notes and other manual processes to run its operations.

“It covers all of our department, including accounting, quality control, production, scheduling, inventory, assets, and dispatch,” Kilgore explained. “Everything flows through from start to finish.”

One of Tricon Precast’s earliest uses of the software was for its MSE wall product line.

“That presents unique challenges because when we receive our engineering drawings on these projects, for example, they may include thousands of different panels,” Kilgore said. “You obviously can’t have someone sitting there, manually inputting all of that information.”

The inputted data would be error-prone, and the job itself would be “very horrible to have,” he said. Using Titan II’s Inventory Quantity Sheets, the precaster imports the drawings via an app that lets it import several thousand unique, special panels within just a few seconds.

This is just one example of how Tricon Precast has adopted digitized processes to bring its operations into the 21st century. In return for its investment, the company is saving time, money, labor and other expenses associated with manual processes. He tells other precasters to carefully assess the time and money they spend doing things manually on a daily basis – and across all of their departments – and then look for



7

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*Gregg Jacobson, General Manager  
Wells Concrete Products Company*

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ways that technology can help automate and speed up those tasks.

"Tally up all the time that your employees are spending on manual and handwritten processes, and the number will probably be astounding," Kilgore said. "The more you can automate, the more you can do. Even shaving just 10 seconds off here and there will add up to substantial savings over time."

The good news is that we're living in a digital age where the technology to improve just about any business process likely already exists in some form or another and a lot of companies have probably already tested out these applications to see if they work or not.

"The days of being a guinea pig and trying to figure how to best leverage technology are gone," Kilgore said. "Many other organizations share your pain points and have already figured out how to minimize mundane processes and make them more efficient."

### BREAKING THROUGH THE BARRIERS

Ultimately, a company's employees can make or break a new technology implementation. A precaster that's been using the same procedures for years, and then suddenly wants to automate processes, reallocate labor and/or otherwise switch things up could encounter friction if it moves too quickly. To overcome this issue, Allsbrook tells companies to find a champion who gets the company's vision for the future and can also spread that gospel throughout the office, sales team, plant floor, delivery team or all of the above.

"Find someone who can be a driver of change, and also who can help bring everyone else along," said Allsbrook, who tells precasters to stress the improvement side of the equation, versus talking too much about how much everything is going to change. "No one really wants to be filling out paperwork, writing daily reports, putting dipsticks in fuel tanks, or other mundane tasks. They want to do work that adds value, and technology enables that."

When implementing new technology and business processes, business consultant Robyn Bolton, founder of Boston-based MileZero, tells precasters to start small by selecting no more than three new initiatives to pursue at once. Understand that even though people may nod along as you talk about the need to change, most of them don't want to be changed or even deal with change.

"The status quo is comfortable for most people, so our natural tendency is to resist change," Bolton said. "As a result, any change, no matter how small, can meet with resistance."

To break through this natural barrier, Bolton tells manufacturers to put time into communicating the "what" and the "why" of the initiatives. "In the absence of this information, employees make up stories that are rarely positive," said Bolton. "By telling people the reasons why change is needed, they'll be more apt to accept the change."

Finally, Bolton said directives from the top should be consistent and should follow through right to implementation.

"Executives usually announce changes at the start of the initiative and then disappear, pushing communication responsibilities down into the organization," Bolton said. "For change to be both effective and long-lasting, senior leaders need to communicate success, progress and challenges at least monthly to show everyone that the initiatives are still high priorities." **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.*

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# Free Software to Help NPCA Members Measure Improvement

By Claude Goguen, P.E., LEED AP

Let's say you are starting a weight loss plan, and you could quickly find out how many pounds you could potentially lose if you switched your morning pancakes and syrup to a bowl of oatmeal. That would be quite a useful tool for many looking to slim up.

Unfortunately, we don't have such a resource to offer; however, for those precast concrete manufacturers who want to see how changes in raw material procurement, energy use and water use affect your bottom dollar – and the impact on the environment – you're in luck.

For example, let's say you find a new supplier of aggregates who is 30 miles away rather than 55 miles away. Depending on your fuel costs, that could save \$.30 per ton of precast manufactured. If you produce 15,000 tons in a year, you'd find an extra \$4,500 in your pocket. And, you reduce your Global Warming Potential by 1.4% or 50 tons of CO<sub>2</sub>. These figures are based on very specific fuel prices. However, NPCA's Sustainable Plant Tool can help you calculate impacts and likely cut costs, and it is completely free for NPCA members.

## THE SOFTWARE

The Microsoft Excel-based data-collecting and benchmarking tool was created by the Athena Institute and financed by NPCA, the Canadian Precast/Prestressed Concrete Institute and the Precast/Prestressed Concrete Institute.

Much of the work involved in using this spreadsheet is the initial data entry. Information on raw material use, including how many tons

of cement, gallons of admixtures and tons of rebar must be compiled and entered for a specific time period. Along with this information, the distance the material travels from the source to the plant and by what means also needs to be entered. Additional inputs include energy use, fuel consumption, water use and waste disposal. The intuitive spreadsheet contains instructions on the different required data points. Also, members wanting a tutorial on how to use the spreadsheet can watch a free, recorded webinar presented by one of the creators of the software program.

Once the initial information is entered, updates can be made monthly, quarterly or annually to see seasonal effects. It also helps to see or predict how changes in material usage, transportation and energy use can impact the three environmental impact measures: global warming potential, primary energy consumption and water use.

The scope of the tool spans from resource extraction to when products leave the plant to be transported to the job site.

## IS SUSTAINABLE CONSTRUCTION STILL RELEVANT?

While there may be some economic incentives to reducing energy, waste and water use at the plant, these are also strategies to secure work in a growing green building market. The latest 2018 Dodge Report, titled "World Green Building Trends 2018"<sup>1</sup> states that green building activity is expected to grow dramatically in 20 countries, including the U.S. between now and 2021. Client demand is cited as driving this market in the U.S. Here are examples from 3 of the largest U.S.-based construction companies:

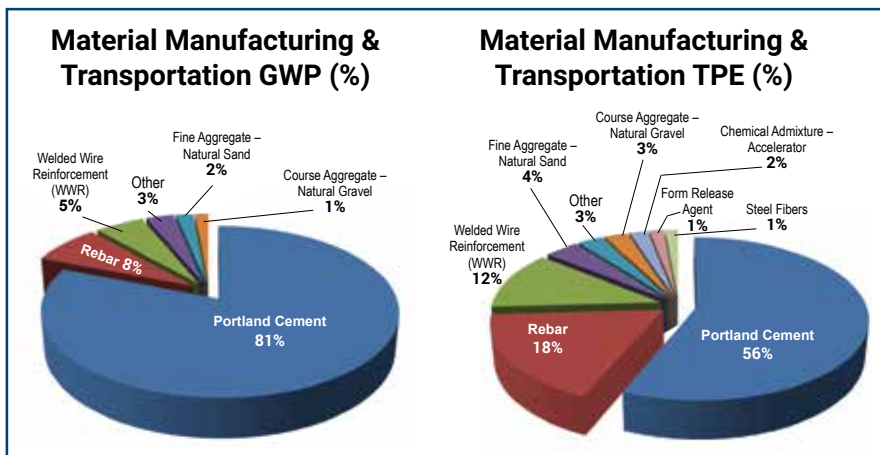


Figure 1. Examples of graphical results. Left, global warming potential by % for each material. Right, total primary energy use by material.

- ▶ Turner Construction Company, a North America-based, international construction services company that is consistently in the top 10 largest construction companies in the United States (based on total annual revenues), announced earlier this year it is targeting a 50% cut in greenhouse gas emissions and water use from construction activities by 2030.<sup>2</sup>
- ▶ Bechtel Group, Inc. the largest construction firm based in the U.S., pledges to use sustainable alternatives to reduce its environmental footprint on 100% of their key projects and non-project facilities by 2030.<sup>3</sup>
- ▶ In its 2018-2020 Sustainability Report, Jacobs Engineering Group has implemented a program called "PlanBeyond" which outlines its commitment to sustainability that includes "partnering with ...

suppliers to influence and drive progress through the provision of more sustainable options across [all] products and services.”<sup>4</sup>

Sustainability is becoming increasingly relevant, and it can be a powerful competitive advantage when one of these or many other green building-oriented customers come calling.

### THE FIRST STEP

Say what you’re going to do, do what you said you would do and prove it. These are the three basic elements of a quality assurance system. First, you set your goals and how you will reach them. Then you execute based on that plan. And finally, you test the results and document throughout to prove that it worked. This can be applied to a sustainability initiative.

Pick one thing you want to improve. Perhaps it’s enhancing energy efficiency in the plant by replacing light fixtures, using natural lighting or using lighting zones that only activate when someone is present. Perhaps it’s reducing the amount of waste that is being hauled from your facility.

Once this decision is made, designate someone to obtain this software program and fill in the blanks. Once this initial data entry is completed, execute the initiative and update the numbers next month, next quarter or next year to determine the impact your operations had.

The software allows the user to print out specific metrics in the form

of pie charts to effectively convey the before and after of the changes made. This is the first step that can be used as documentation and marketing material to support your support of green building practices. It can also be the first step to many more enhancements to your facility that will save you money and potentially open up new business opportunities.

To request this software or to learn more, please reach out to Claude Goguen, P.E., LEED AP, at NPCA. He can be reached at [cgoguen@precast.org](mailto:cgoguen@precast.org) or directly at 317-582-2328. **PI**

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

#### RESOURCES:

1. Dodge Data & Analytics – World Green Building Trends 2018 <https://www.worldgbc.org/sites/default/files/World%20Green%20Building%20Trends%202018%20SMR%20FINAL%2010-11.pdf>
2. Turner Construction News Release – April 22, 2019 - Turner Construction Company Announces Sustainability Program to Achieve Higher Level of Environmental Efficiency and Resiliency <https://www.turnerconstruction.com/news/item/9e22/Turner-Construction-Company-Announces-Sustainability-Program-to-Achieve-Higher-Level-of-Environmental-Efficiency-and-Resiliency>
3. Bechtel – 2030 Targets - <https://www.bechtel.com/sustainability/2030-goals-targets/>
4. Jacobs Engineering Group – 2018-2020 Sustainability Strategy - <https://www.jacobs.com/sites/default/files/2019-04/Jacobs-2018-2020-Sustainability-Strategy.pdf>



Also consider visiting the Sustainability Page for more information on this and other related tools and information at [precast.org/sustainability](https://precast.org/sustainability)

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# Fatal Four

IN FOCUS

Whether small or robust, implementing training programs that address **Focus Four** hazards is key to mitigating issues at your precast plant.

by Mason Nichols

From production-floor team members to plant managers and ownership, a commitment to safety in all facets is vital to successful operations in the precast concrete industry. Whether your plant manufactures a small number of standard products or a wide range of custom pieces, every employee plays a crucial role.

Just ask Donald Graham, risk management consultant for Barrett Business Services of Roseville, Calif. Graham spent more than two decades as a safety director in the precast industry. On one occasion, Graham was walking through the plant and noticed an extension cord lying in the walkway.

“I looked at the cord and saw frayed insulation, but in my mind, I had bigger fish to fry, so I didn’t do anything about it,” he said. “I did come back about an hour later and get the cord – but what could have happened in that hour?”

Minor lapses in judgment can result in catastrophic consequences. To help increase awareness and place an emphasis on the areas of highest risk, OSHA developed the Focus Four campaign.<sup>1</sup> The effort places a spotlight on the four deadliest hazards in the construction industry: falls, struck-by, caught-in/between and electrocution.

## 1. FALLS

According to the Bureau of Labor Statistics, falls were responsible for nearly 40% of deaths in the construction industry in 2016.<sup>2</sup> The next closest category was struck-by (9.4%), making falls the leading cause of death, by far. In the precast industry, fall hazards can exist throughout the plant.

A healthy portion of production work requires team members to work on and around forms. This work often includes the use of platforms, elevated structures and ladders – all of which place workers at elevation, introducing the risk for falls. Fall hazards can also exist near batch plants and silos.

Basic measures that can be taken to limit falls include installing proper guardrails around hazard areas and ensuring that workers operating at 6 feet or higher (4 feet in areas designated under OSHA standard 1910.23) are equipped with proper fall protection equipment.<sup>3</sup> Andre Deveau, environment, safety and health director for Forterra Building Products, stressed that one particular approach offers the ideal solution for combating falls.

“Elimination is the best method,” he said. “If there’s no way a person can fall, you no longer have to worry about a person working at heights.”

For Deveau, elimination is made possible by installing landings and scaffolding and providing the proper equipment for personnel at all times.

## 2. STRUCK-BY

While occurring far less frequently than falls, struck-by accidents, which “are produced by forcible contact or impact between the injured person and an object or piece of equipment,” remain a hazard in the precast concrete industry.<sup>4</sup> Workers are frequently in proximity to heavy equipment and products of considerable size, resulting in the potential for dangerous working conditions in the absence of proper precautions.

“A lot of struck-by comes down to culture,” Deveau said. “For example, when people are using cranes and moving objects with them, it’s training that the worker should never have a hand on the object, because you’re using a machine that’s much stronger than you.”

In addition to objects moving through the air, falling objects can also

result in struck-by incidents. One approach for mitigating accidents in this category is to ensure proper rigging is in place. This means checking load tags to ensure the rigging capacity exceeds that of the lift by the necessary factor of safety, examining the rigging before use for signs of wear and tear that could affect capacity, and repairing or removing defective slings.<sup>5</sup>

Though it sounds straightforward, being aware of your surroundings is also key. As Deveau explained, preventing struck-by incidents most often comes down to having team members understand what’s happening and where objects are heading so they aren’t placing themselves in harm’s way.

## 3. CAUGHT-IN/BETWEEN

This Focus Four category is often confused with struck-by accidents due to the similar nature in which incidents occur. The key difference deals with impact. If impact alone creates the injury, a struck-by accident has taken place. But if the injury is created “as a result of crushing injuries between objects,” the event is classified as caught-in/between.<sup>6</sup>

Caught-in/between accidents can be just as devastating as struck-by, and to avoid them at your precast plant, workers must follow the same guidelines listed for struck-by. For Forterra and Deveau, it’s important for employees to take all potential hazards in this category seriously, including hand injuries, which is a common caught-in/between hazard.

“We’ve really placed an emphasis on machine guarding in this area,” he said. “As I’m using the equipment, ‘What’s going to happen? Where are my hands at all times?’”

This is crucial, because while a hand injury may appear to be much less severe than being trapped between a wall and a piece of equipment, a scrape or laceration could lead to infection, which could lead to an amputation, or, in extreme cases, death. As a result, Deveau explained that team members should never overlook any type of hazard or injury, regardless of the perceived danger.

## 4. ELECTROCUTION

Electrical hazards exist in many areas of the precast plant, from heavy machinery to electrical panels, extension cords, hand tools and more. They expose workers to burns, electrocution, shock, arc flashes or blasts, fire and explosions. Any event occurring in this category can be catastrophic and, as such, Deveau said Forterra placed an emphasis on lockout/tagout procedures to eliminate electrical hazards across their plants.

“Electricity doesn’t care if you have 20 years of experience and no injuries,” he said. “If you’re working in an area and put your hand in a wrong spot with a live wire, that’s all it takes.”

Graham agreed with Deveau’s assessment, and also stressed that electrical hazards can be created by a lack of training, such as not using industrial-grade extension cords. The same issues that arise with extension cords can also occur with faulty equipment. Check all energized equipment before use to ensure proper working order and examine your surroundings. If you identify a concern, immediately address it or vacate the area.

## TURNING THE TIDE

Risk of accidents and injuries is a reality of working in the precast concrete industry. As production pressure climbs and businesses work diligently to acquire more work and push more product, the potential



for Focus Four accidents increases. But preventing devastating injuries is possible – and it doesn't have to mean installing a large, expensive safety program. Success can be achieved even on a small scale. Graham suggests starting with an emphasis on behavioral safety.

“In effect, this is teaching your team members that they are responsible for their actions,” he said. “But it's also, ‘I'm responsible for yours.’ If I see you being unsafe, it's my responsibility to say, ‘Hey man, don't do that!’”

Another option is implementing a safety committee. Empowering the committee and rotating members through is a great way to get started at your plant. It also allows all personnel to buy into the importance of protecting one another. Ultimately, for Graham, it's about not being afraid to try new things. As he explained, the process is iterative, and if you keep working at it, the right methods will stick.

For plants with more refined safety systems in place, other approaches may be more viable. Forterra conducts a “Safety Program Review” that covers a new topic every month. The company creates an 8-15 question audit for plant managers that runs sidestep with employee training and toolbox talks. As a result, for the entire month, every single person in the company is focused on the same safety topic.

A few years ago, Forterra also rolled out a comprehensive safety website that includes toolbox talks as well as in-depth videos on a wide variety of safety topics, including everything from PPE to welding, safe lifting practices and beyond.<sup>7</sup> The platform has been particularly beneficial for new employees.

“We don't just show a new hire the equipment,” Deveau said.

“Before they even get to the plant, they'll watch a video that shows the equipment and the safety risks. Then, when they arrive, they're instantly able to recognize what they've seen.”

The company also plans to roll out communication boards across its locations this year. Each board will highlight employee birthdays and anniversaries but will also incorporate training videos to help keep safety top of mind.

## JUST A NANOSECOND

For companies with solid safety records, devoting extra time or attention to the Focus Four safety hazards may seem extraneous or even unnecessary. After all, why devote time and resources to an area that – at least until now – hasn't been of concern?

Graham explains it best.

“Sometimes, you have serendipity in the workplace,” he said. “You can conceivably work an entire career, never follow a safety rule, and never get hurt or hurt anyone else. But then again, it only takes a nanosecond.” **PI**

*Mason Nichols is a Grand Rapids, Mich.-based writer and editor who has covered the precast concrete industry since 2013.*

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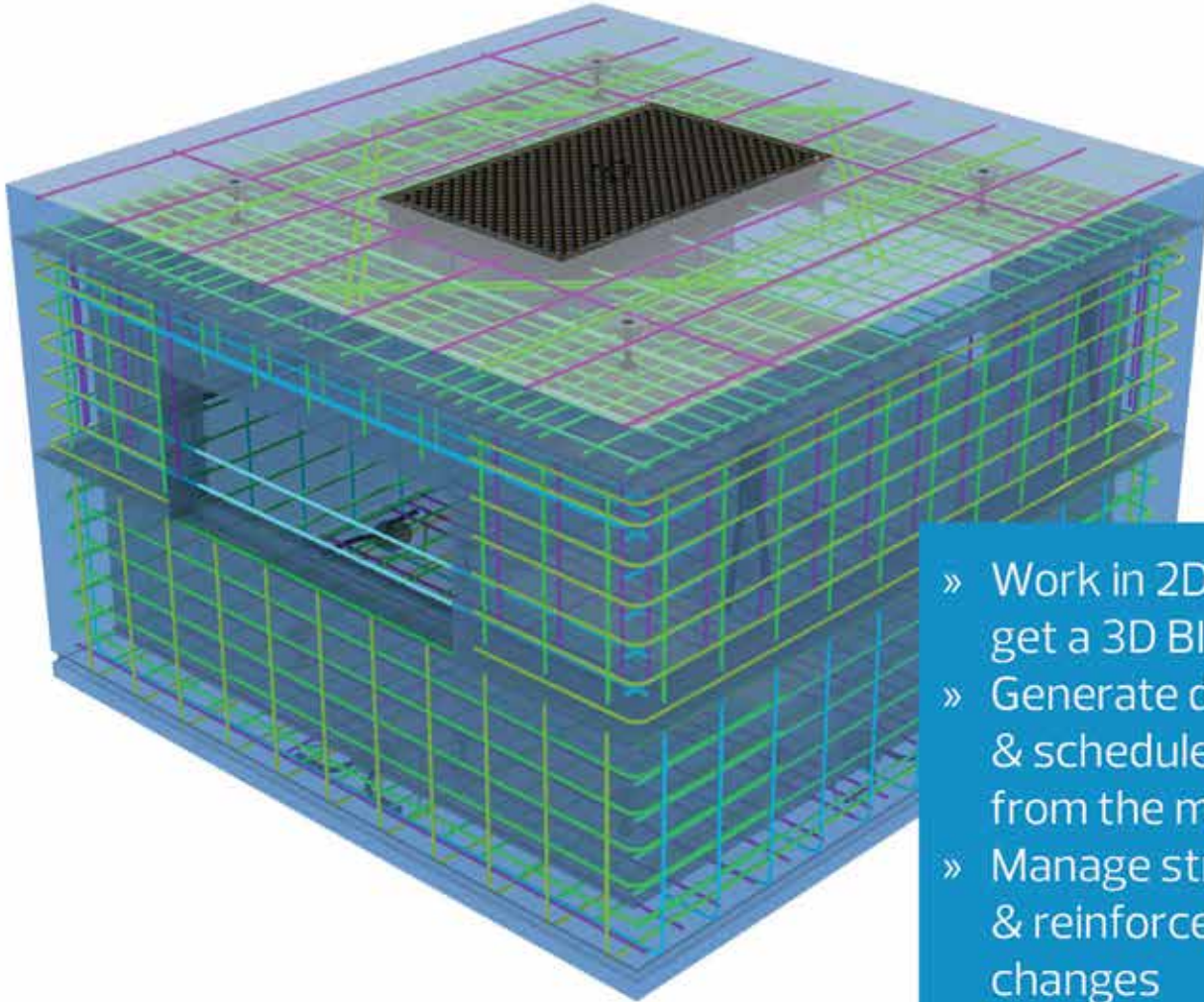
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# Making Networking Work

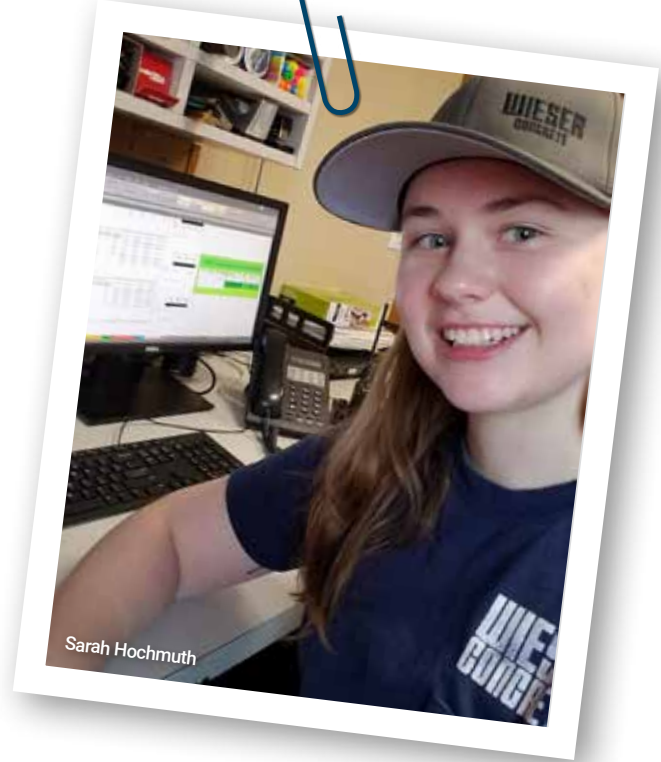
UW-Platteville graduate **Sarah Hochmuth** benefits from NPCA Foundation connections.

By Sara Geer

Applying to nine summer internships and receiving nine rejection notices would cause some to wonder what they're doing wrong. Yet, Sarah Hochmuth, a junior at the University of Wisconsin-Platteville at the time, didn't let that keep her down. She kept moving forward with her summer plans to attend the 2017 ASCE National Concrete Canoe Competition, sponsored by NPCA's Foundation, held in Golden, Colo. While there, something better than she could have imagined occurred.



Sarah Hochmuth was part of the UW-Platteville concrete canoe team. It was there she connected with NPCA member Greg Roache, who introduced her to Mark Wieser, of Wieser Concrete Products.



## CHANCE ENCOUNTER

Hochmuth said the school had a good chance to attend nationals the year she joined the UW-Platteville concrete canoe team.

"I was like, 'How do you do that? Explain it to me,'" she said. "I was very interested in it, so I joined the team, and we did end up going to nationals, which was held in Colorado."

While in Colorado, there's something to be said about being in the right place at the right time, which is the exact scenario Hochmuth found herself in one night. Her team was eating dinner at the hotel restaurant at the same time as Greg and Lisa Roache, president and vice president of Gainey's Concrete Products in Holden, La.

Greg said he recognized the team from the concrete canoe competition, where the Foundation had a hospitality tent, and decided to introduce himself and ask each team member what they were studying. When he reached Hochmuth and found out she had received nine internship rejections, he handed her his business card and made a commitment to find her a summer job.

"We are big advocates of interns," Roache said. "When do we get busy? During the summer months. And when are interns available? During the summer months. It's a viable resource to give some extra help.

"It's a win-win for the precaster and the intern."

Hochmuth said when she heard the confidence in Roache's voice, her heart was racing. She didn't think it was going to happen.

"I was amazed that could even be possible because he had asked us where we live," Hochmuth said. "I said I lived in Wisconsin, and he goes, 'Oh, I know somebody who I can get you an internship with there.' And that's how I got in contact with Mark Wieser."

## TAKING A RISK

When Wieser, vice president of Wieser Concrete Products, received an email from Roache that said Hochmuth was looking to get some job experience, he jumped at the opportunity to have her visit the Portage plant.

The company had never had an intern before but decided to follow the free, online internship template the NPCA Foundation, in partnership with Precast/Prestressed Concrete Institute Foundation, had created.

"She was living about an hour away from our office, so she drove up

and did an interview,” Wieser said. “I offered her a mini internship for the rest of the summer because there was only 6 weeks left by the time she could start.

“So, we turned a 12-week internship into a 6-week one, and she spent one week in every department.”

Hochmuth started out the first week working in the shop tying rebar and ended the last week making CAD drawings for actual projects. The hands-on experience showed her how each product was put together from design to on-site installation. She even applied what she learned in the classroom when the quality assurance manager explained cylinder and slump testing.

“Another thing I thought was cool was how many people that work at Wieser Concrete are specialists at their jobs and are very good at what they do,” Hochmuth said. “I was in their shoes for a couple of days, but I couldn’t imagine doing some of the things they do on a daily basis. If I could have a fraction of their knowledge, that, to me, would be amazing.”

Wieser said when Hochmuth finished the internship, his reluctance about hosting internships disappeared, and he saw for the first time the many benefits it offered the company. The internship allowed Wieser to see the potential in Hochmuth, and he invited her to come back the following summer to work on CAD drawings. After the second summer, she also worked on drawings remotely during her last semester at college.

After graduating in December 2018, she was offered a full-time position at Wieser Concrete in the drafting department.

“When we followed the Foundation internship template, it really was painless and beneficial,” Wieser said. “We not only got a productive employee for the summer, it developed into a full-time position.”

Wieser added that without the National Precast Concrete Association or the Foundation and the benefit of networking with members like Greg and Lisa Roache, he and Hochmuth would not have known about each other.

Roache agrees that networking is NPCA’s biggest benefit.

“Gainey’s exists today because of the power of NPCA’s networking,” he said. “We believe that we give, but we always get more than we give. Because on any given day, on any given subject, I have other precasters who I can call that will stop everything and help me personally and Gainey’s.”

## STRONG FIRST YEAR

Hochmuth started at Wieser Concrete with no experience in construction or engineering but has thrived in her new job. Wieser said she learns fast, has a great attitude and tries really hard at everything thrown at her. It also has helped that their relationship is built on giving her constant support to learn and grow professionally.

“It’s so nice that Mark’s office is right next to mine,” Hochmuth said. “I come into his office regularly to ask questions, and he’s always willing to help. I’m so grateful for that.”

Midway through her first year, she has worked on many different projects including drawing manholes and box culverts. She finds great joy in the work she does and is thankful every day that she had that chance encounter with Greg and Lisa Roache in Colorado.

“I thought it was sweet of Greg and Lisa to send me an email on the first day I started my full-time position congratulating me on getting hired,” Hochmuth said. “I actually still keep that business card Greg gave me and I’m never throwing it out. There may be a chance I could pay it forward again to someone else.” **PI**

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



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Hochmuth served as an intern for Wieser Concrete for six weeks. After she graduated college, she was hired on full-time at the company.

Photo courtesy of Sarah Hochmuth





Learn more about the Foundation at  
[precast.org/foundation](http://precast.org/foundation)

# 2019 NPCA FOUNDATION Scholarship Recipients

In 2019, The NPCA Foundation awarded scholarships to eight undergraduate students and one graduate student pursuing studies related to civil engineering, architecture and construction-related curricula. The scholarships provide financial aid and increase students' awareness of the many benefits precast concrete products can provide the specifying community. The NPCA Foundation thanks NPCA members who sponsored the recipients.

As part of the requirements for receiving the scholarship, students work a minimum of 320 hours at an NPCA member company each year in order to receive scholarship 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. **PI**



**Stephen Grant**

**School:** SUNY Polytechnic Institute

**Sponsor:** Husted Concrete Products, Inc.



**Mohamed Hassan**

**School:** New Jersey Institute of Technology

**Sponsor:** Shea Concrete Products



**Michael Miller**

**School:** University of Wisconsin

**Sponsor:** Grove Concrete & Supply



**Ian Undergurger**

**School:** University of Cincinnati

**Sponsor:** County Materials Corp.



**Chaz Phillips**

**School:** University of Georgia

**Sponsor:** Earth Wall Products



**Craig Preach**

**School:** Gateway Community College

**Sponsor:** Olson Precast of Arizona



**Matthew Rodberg**

**School:** Stevens Institute of Technology

**Sponsor:** Garden State Precast



**Terry Young**

**School:** Methodist University

**Sponsor:** Tindall Corporation



**Josh Tomczak**

**Daneen Barbour  
 Graduate Scholarship**

**School:** University of Minnesota

**Sponsor:** Wieser Concrete Products

Congratulations to all the 2019 NPCA Foundation scholarship recipients!



# 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](https://precast.org/working-for-you). This recap provides a high-level overview of staff activities throughout the past six months. Visit the Working For You page to read the full stories or learn more.

## Certification & Specifications

NPCA continues to promote precast and NPCA plant certification to federal agencies, state DOTs, cities and counties. Earlier this year, the Federal Aviation Authority published its new set of specifications for construction under the FAA's authority at more than **19,000 airports** in the U.S. Now, the Department of Defense is mirroring the FAA specification upgrade, including the NPCA Plant Certification Program as a third-party QA program accepted for all architectural precast and drainage structures on DOD-funded projects.

The NPCA Plant Certification program continues to expand through ongoing work with DOTs and municipalities. In Texas, the new Departmental Materials Specification now requires NPCA Plant Certification for drainage structures such as manholes, inlets, junction boxes and box culverts. The state of Michigan has recently added the NPCA Certification requirement for drainage structures to go along with its previous requirement for MSE walls.

## Codes & Standards

NPCA professional staff members have attended or been on conference calls for **32 meetings** as they actively represent the precast concrete industry on **40 codes and standards groups**, committees and task forces.

NPCA professional staff members also represented the precast concrete industry at major codes and standards-related events throughout the first half of 2019. Director of Codes and Standards, Eric Carleton, P.E., attended several of those events, including the 2019 Transportation Research Board Annual Meeting, 2019 ACI Spring Convention, 2019 National Transportation Product Evaluation Program Annual Meeting and the Water Environment Federation Collection Committee Specialty Conference. Additionally, Director of Quality Assurance Programs, Phil Cutler, P.E., and Director of Outreach and Technical Education, Claude Goguen, P.E., LEED AP, attended the ASTM June 2019 Committee Week.

## Marketing

Targeted advertisements have driven more than **200,000 visitors** to precast.org in the first half of 2019. NPCA's Facebook and Twitter accounts have added **2,594 new followers** this year and had more than **375,834 engagements** such as likes, shares, comments and retweets.

## Other Activity

### NPCA adds two outreach-related Precast Learning Lab videos

In May, NPCA published two new Precast Learning Lab videos to the official NPCA YouTube channel. The videos aim to provide members with guidance and tips on hosting plant tours and building relationships with the academic community. Members who are both inexperienced and veterans in community outreach can watch the videos by visiting [youtube.com/NationalPrecast](https://youtube.com/NationalPrecast) and clicking on the Precast Learning Lab playlist.

### NPCA creates a landing page just for students and professors

NPCA has dedicated a portion of its outreach efforts to developing relationships within academia at schools across the country. Through these relationships, NPCA can help professors educate their students on the benefits of precast concrete as well as career opportunities in the industry.

To further build these relationships beyond in-person presentations, as well as to engage with additional schools, NPCA launched a page dedicated to all the resources geared for students and professors. Visit the page at [precast.org/welcome-students-professors](https://precast.org/welcome-students-professors) to learn more and to share it with those in your network you feel will benefit from its content.

## Specifier & Academia Outreach

NPCA professional staff members have made in-person presentations to **2,683 specifiers** and **400 academia**, with several additional presentations planned through the remainder of 2019. On August 27, NPCA's 2019 Specifier Webinar Series kicks off with a webinar on new technologies in precast bridge construction. Three additional specifier webinars will follow on jointed precast concrete pavement, resilient infrastructure and gravity grease interceptors. Visit [precast.org/npcawebinars](https://precast.org/npcawebinars) for course and registration information.



# 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).*

## The Hill and Griffith Company Welcomes Executive-Level Director of Sales

The Hill and Griffith Company is proud to welcome **Ryan Canfield** as the company's Director of Sales & Business Development.



Ryan Canfield

Canfield will be responsible for sales team leadership, driving revenue, contributing to product selection, marketing, as well as general management responsibilities. He comes to H&G with 17+ years of experience in sales, technical support, marketing and engineering for the foundry, die-cast, precast and prestress concrete industries. He also holds an engineering degree from Trine University in Angola, Ind., and joins the H&G team from Carbo Ceramics located in Houston.

## Thomas Faulkner Joins iwi Concrete Equipment Group

**Thomas Faulkner** has joined the iwi Concrete Equipment Group team and will be covering South and North Carolina and part of Georgia. Faulkner graduated from Kennesaw



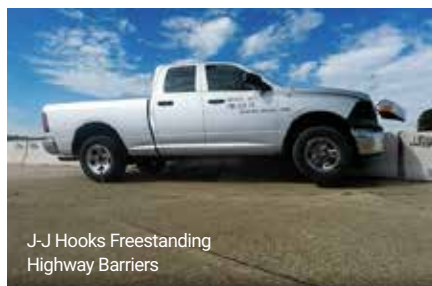
Thomas Faulkner

State University in 2015 and spent the last four years with Freud America, a division of Bosch, where he rose to become a district sales manager for Georgia, Alabama and Tennessee.

## Maryland DOT approves J-J Hooks Freestanding MASH-Tested Highway Barriers

Maryland State Highway Administration (MDSHA) has approved MASH TL-3 tested J-J Hooks temporary precast concrete safety barrier for freestanding installations. Previously, MDSHA approved the MASH-tested J-J Hooks design for restrained (bolted and pinned) installations. Thirty-six Departments of Transportation across North America have now approved J-J Hooks MASH barrier for use, with more anticipated in the near future.

The freestanding J-J Hooks MASH TL-3 barrier approved in Maryland will be produced by Easi-Set licensed producer Smith-Midland and available for rent through their Concrete Safety Systems division in the Virginia, Washington D.C., Maryland, Delaware and West Virginia markets.



J-J Hooks Freestanding Highway Barriers

## Besser Company Announces Promotions, Retirement

Besser Company recently announced the promotion of **Richard Dolly** to regional sales manager – west and Ralph Schlereth to regional sales manager - east.

As regional sales managers, they will lead a multi-talented team of seasoned sales representatives.



Adam Wallace

**Adam Wallace** also joined the Besser team as the sales manager for new products. In this role, he is responsible for promoting the sale of equipment, parts, paid service and training to customers and prospects.

In addition, **John Reedy** recently announced his retirement from Besser Company. Reedy came to Besser in 2005 and will continue his career with Besser in a mentoring role.

## New EMH Hoist Provides Enhanced Features, Benefits and Capabilities

Engineered Material Handling recently introduced its new EG Series Hoist, providing next generation enhanced features and benefits to its E Series Hoist for single girder cranes. With the new EG Series Hoist, trolley adjustment is easier than ever with integrated and robust staging that stays tightly together during adjustment.

The EG Series Hoist is also designed to have a more spacious enclosure to accommodate much larger control panels and variable frequency drives. It will have capacities of 3, 5, 7.5 and 10 metric tons, and 20, 33, 50 and 65 foot lifts. The 5-ton and 20-foot lifts will be rolled out first. The complete range will be available progressively by the end of 2020.

## Tindall Builds New Batch Plant Facility, Receives Award

Tindall Corporation's Spartanburg, S.C.,



Tindall Corporation's new batch plant in Spartanburg, S.C.

facility is building a new state-of-the-art batch plant facility that will increase production and support the company's overall growth and manufacturing demand. The space is estimated to be completed this summer.

The batch plant will serve the South Carolina Prestress and Utility Divisions.

In addition, its Asheville Regional Airport parking deck was awarded the 2019 Commercial Airport Project of the Year – Architectural Project by the Southeast

Chapter of the American Association of Airport Executives. Tindall Corporation manufactured the architectural precast concrete that helped create the iconic exterior design that seamlessly blends with the airport's Blue Ridge Mountain landscape.

### Reading Rock, Columbus Coal & Lime Co. Combine Resources

Reading Rock, Inc., and Columbus Coal & Lime Co., have combined resources to form the most comprehensive manufacturer/distributor of “hard” building materials and services in central Ohio, Reading Rock+CCL.

With a combined 200 years of family owned and operated experience, Reading Rock+CCL will now offer a “one stop shop” for manufactured as well as distributed building materials for commercial, residential and restoration projects.

### M.A. Industries Announces New Board Director

**Scott Peacock** was recently announced as a director for the M.A. Industries Board of Directors. Peacock serves as the senior vice president of sales for M.A. Industries Inc., which is celebrating its 50th anniversary this year.

### Fabcon Invests in New Systems

Fabcon recently announced two new major investments for its operations in Kansas. The company invested in a new shuttering system and a novel way of handling shutters that was purchased from the German manufacturer Weckenmann Anlagentechnik GmbH & Co. KG.

Profiles with switchable magnets make up the main component of the shuttering system. These are used to efficiently produce up to 12-inch-thick premium-quality panels. The system is used on self-stressing flat slab beds.

The company also invested in a new saw developed by Weckenmann that can cut precast concrete elements with or without insulation that are up to 12 feet wide and 14 inches thick. Depending on the element width, a single cut is completed in less than 6 minutes. **PI**

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**NPCA 54TH ANNUAL CONVENTION**  
 Hyatt Regency Seattle  
 Seattle, Wash.



**March 5-7, 2020**  
**THE PRECAST SHOW 2020**  
 Fort Worth Convention Center  
 Fort Worth, Texas



**Oct. 15-17, 2020**  
**NPCA 55TH ANNUAL CONVENTION**  
 Omni Amelia Island Resort  
 Amelia Island, Fla.



**Feb. 25-27, 2021**  
**THE PRECAST SHOW 2021**  
 Ernest N. Morial Convention Center  
 New Orleans, La.



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

## ADVERTISERS INDEX

Adelphia Metals Inc. ....	21
All Erection & Crane Rental Corp. ....	9
Allplan Inc. ....	41
American Step Co. Inc. ....	13
BASF Corporation ....	35
Besser Company ....	17
CAM Products ....	Back Cover
Cintas ....	3
ERMC ....	19
Euclid Chemical Co. ....	22
Full Circle Water a Division of Pristine Environmental ...	37
Haarup North America Inc. ....	Inside Front Cover
Hamilton Form Co. ....	34
Harris Supply Solutions ....	29
KRB Machinery Co. ....	30
M.A. Industries Inc. ....	31
MAX USA Corp. ....	40
iwi Group ....	43
National Wire LLC ....	20
Oklahoma/Iowa Steel & Wire Co. ....	47
Pennsylvania Insert Corp. ....	47
Polylok Inc. ....	Tab Back
POPIT Inc. ....	16
Precise Forms Inc. ....	23
RoMix Inc. ....	4
Scranton Craftsmen Inc. ....	16
Strike Products ....	Inside Back Cover
Titan II Precast Management System ....	Tab Front
Tucker's Machine & Steel Service Inc. ....	1
Weckenmann Anlagentechnik GmbH & Co. KG ....	12

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