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A Publication of the National Precast Concrete Association | JULY/AUGUST 2018

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Precast Inc. (ISSN 1940-9184 print, ISSN 1940-9192 online) is published bimonthly by NPCA.
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NPCA is a trade association representing the manufacturers of plant-produced concrete products and the suppliers to the industry around the world.

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For 44 years, the Michie family has been working to perfect its business. Now, the next generation will take its turn at the wheel.



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On the Cover:

Michie Corporation manufactures a wide range of products, including 3-sided arch bridge structures.

Photo courtesy Michie Corporation

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WHY USE AN INTEGRATED SOFTWARE PACKAGE?



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.

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

Lauren writes:

(Regarding precast concrete pavement) How much time does it take for precast concrete paving slabs to be created? How much time would it take for the slabs to be installed/replaced versus the traditional methods of construction? And, will the method that uses the engineered foam still have the quality and longevity as the leveled slab?

NPCA Technical Services engineers answered:

NPCA has recently published the *Manual for Jointed Precast Concrete Pavement* that addresses your questions in your inquiry. The manual can be found at precast.org/jprecp-manual.

Q1: How much time does it take for the pre-slabs to be created?

This depends, but typically precasters who are manufacturing a jointed precast concrete paving slab with traditional reinforcement can cast 8-to-12 slabs a day. They are stripped from the form

the following production day. When manufacturing pre-stress slabs, some precasters have been known to fabricate 30-plus panels in a production day.

Q2: How much time would it take for the slabs to be installed/replaced versus the traditional methods of construction?

This also depends on if you are asking about a continuous roadway repair or intermittent roadway repair. Typically, precast pavement is installed in a 5-to-8-hour work window, which typically takes place overnight. Contractors have been able to install up to 50 precast slabs in that timeframe, resulting in 500-to-1000 feet of new pavement placed overnight with minimal disruptions.

Q3: Will the method that uses the engineered foam still have the quality and longevity as the leveled slab?

This question is best answered by contacting a foam manufacturer, but by all indications, yes, the quality and longevity are comparable. There are a number of projects in New York and New Jersey that have used this method.

Dan writes:

When combining two rebar lengths together that have epoxy coating, how far back do you remove the coating before performing the weld?

NPCA Technical Services engineers answered:

According to the CRSI Manual of Standard Practice, reinforcing steel should be welded according to the American Welding Society, AWS D1.4/D1.4M. If the steel used for the coated bars meets ASTM A706, "Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement," the bars are intended for welding without preheating and should be specified for applications that require an appreciable amount of welding. ASTM A615, "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," reinforcing bars can be welded, but may require preheating the bars up to 500 degrees Fahrenheit. After completion of the welding on epoxy-coated bars, the damaged areas shall be repaired using patch materials meeting ASTM A775, "Standard Specification for Epoxy-Coated Steel Reinforcing Bars."

As far as removing the coating, enough should be removed so no epoxy remains in the path of the weld. This depends on the size of the bar used and the required overlap, splice or development length. **PI**





You're Never Done with Dunnage

Ensuring the right dunnage is used can help protect the quality and appearance of your precast concrete product.

By Eric Carleton, P.E.

How many times have you had to step over pieces of dunnage left behind after structures have been moved or loaded and thought to yourself, "I wish this stuff was cleaned up?"

Well, dunnage may not be glamorous, but it's much more than just "stuff." If used properly, you'll never need to give it a second thought. But if it's not, it can create issues that will cost you both time and money.

QUALITY DUNNAGE REQUIRED

A tremendous amount of time, effort and money goes into making the best and highest quality precast product possible. Amazingly, that can all be lost due to a few scraps of wood. Dunnage, sometimes called blocking, is often

a secondary consideration within the full spectrum of a complex precast concrete plant's production. However, proper application needs to be a vital component and included within the ongoing training regime of the precast workforce.

Dunnage comes in a variety of materials and shapes to meet the specific needs of the product it is designed to protect. Common materials used for precast concrete are wood, plastic, Styrofoam and rubber. While this can be a good application for reuse of discarded timber, careful inspection of the materials is necessary. This should include removing any hardware, looking for hard knots and ensuring the material will not adversely stain or damage the product or create an unlevel stacking situation.

Quality dunnage will provide many safety, quality and economic benefits including:

- ▶ easy access for lift truck fork placement or lifting slings
- ▶ uniform support for products
- ▶ separation from the storage yard surface
- ▶ protection from staining
- ▶ stability on the truck trailer

PROVIDING EASY ACCESS

Although most precast products are cast with various lifting inserts, for speed and convenience, most product handling in the yard is done by large fork trucks. Attempting to slide a steel fork under a precast product lying flush on the ground can lead to chipping or more severe damage. However, appropriate placement of dunnage provides easy clearance for the forks which can apply uniform bearing on the precast product when lifted and substantially reduce the chance of a spall. Additionally, products stacked with dunnage provide adequate openings for workers to safely slip lifting slings around the product.

UNIFORM SUPPORT

Section 4.8 of the NPCA Quality Control Manual for Precast Plants states products are to be stored on firm and level foundations to avoid

or minimize product damage. Over time, these surfaces may become uneven or develop hard spots that could introduce an unexpected concentrated load on the precast structure. In turn, this could result in a spall or crack. Properly placed dunnage can easily be checked for levelness and provides a uniform surface to distribute the load of the precast structure. If products can be stacked, dunnage could possibly distribute the weight of other structures as well.

The following general equation provides a minimum bearing area of the dunnage:

$$A = W / (0.3 \times f'_c)$$

,where:

W = load on dunnage, lbs.

f'_c = concrete compressive strength, psi

A = dunnage contact area, in.²

For example, some precast wall panels will be stored by stacking them horizontally and parallel to the ground. The panels have a compressive strength of 4,000 psi and the calculated total weight at the bottom of the precast panel stack is 40 tons. You plan to use two lengths of dunnage boards to support the stack. What is the minimum required contact area for each of the two dunnage boards?



Total precast load = 40 tons x 2,000 lbs./ton = 80,000 lbs.

W = 80,000 lbs. / 2 boards = 40,000 lbs.

$$A = W / (0.3 \times f'_c)$$

A = 40,000 lbs. / 0.3 x 4,000 psi

A = 33.3 in.² contact area per board

Dunnage protects precast products from staining and damage.

Next, find the required length of each dunnage board based on the required contact area and board's width. Remember, lumber's actual dimensions are less than those portrayed by its nominal size. For example, a 2x4 measures 1.5 in. x 3.5 in. If the dunnage selected in our example is a hardwood 2x4, the minimum length of the dunnage board is to be 33.3 in.² / 3.5 in. = 9.5 in. It is general practice for the dunnage length to run the entire length or width, depending on orientation, of the supported product. This provides easier placement with better assurance of proper dunnage location rather than smaller sections of dunnage carefully placed in specific spots. Smaller sections of dunnage, which provide adequate contact area can be used, but may require a higher level of worker training and QC inspection, or the development of a dunnage placement template to assist with correct and consistent dunnage placement.

Dunnage comes in a variety of materials and shapes to meet the specific needs of the product it is designed to protect.

Common materials used for precast concrete are wood, plastic, Styrofoam and rubber.



Precast products stacked with dunnage allows workers to easily slip lifting rings around them for moving in the yard and transportation.

RAISING PRECAST

Dunnage is typically not required by product specification, but its use should be considered a best management practice. In cold climates, precast components stored directly on the ground can literally become frozen to it, requiring careful effort to not damage the product when attempting to free



Dunnage helps maintain an architectural precast product's appearance.

Review your current precast concrete product storage plans to make sure you are employing the best methods for safe, damage free, and easily accessible storage of finished and received products.

it. More importantly, precast drainage products employing bell and spigot jointing systems require the joint surfaces to be very clean to function properly. The proper use of dunnage provides the best method to keep joints ready to ship without additional time and effort required to scrape and clean the joint surfaces. It is equally important for the contractor to store the material properly on-site to keep these precast joints out of the dirt and free of contamination. To encourage good storage practices, a precast company could offer a toolbox talk and furnish the necessary storage dunnage for the project. Upon completion of the precast installation, the dunnage could go back to the precaster or the contractor could keep it for the next project.

NOT JUST FOR PRECAST

Many precasters store important steel items like forms, pallets and reinforcement outside. Steel components kept outside should be stored on dunnage to avoid contact with the ground. The dunnage should be made from a nonconducting material and be high enough to ensure the stored product will not come in contact with soil or standing water. Any dirt or debris on the steel will compromise its bond strength with the concrete, and steel

stored in contact with the ground for prolonged periods can be more susceptible to corrosion due to its continued contact with moisture. For the reinforcing steel, dunnage spacing must account for potential sagging of the steel between dunnage supports. The American Concrete Institute concisely states this within ACI 318, section 9.1.6, "Product delivery, handling, and storage."

PROTECTION FROM STAINING

For some precast products, small visual anomalies caused by dunnage staining are not a primary concern. However, for architectural precast products, looking good is a primary attribute, and proper dunnage practices need to be used. Traditional dunnage materials may leave staining on the contact surface. Even plastic-coated wood will create color differences by trapping moisture between itself and the concrete surface during the curing process and yarding of the product. Consequently, specialized architectural concrete dunnage products have been developed to answer these needs. One such product is a high-density multimonomer - a non-leaching plastic bubble surface sheet which limits the dunnage contact area to small surfaces spread at uniform spacing. This configuration permits increased air flow and reduces

discoloration. However, calculations are important to ensure an adequate area of bubble dunnage is used to not exceed the allowable bearing on the concrete section. The precaster should be able to obtain dunnage information for this calculation from the dunnage manufacturer.

STABILIZING THE LOAD

For many precast concrete products, the most severe loading is not the final installed condition, but rather loading, unloading, contractor handling during installation, and jostling and dynamic loading during shipment. ACI 318-14 states, "Design of precast members shall consider all loading conditions from initial fabrication to completion of the structure, including form removal, storage, transportation, and erection."

Going back to its original cargo shipping roots, good dunnage used during truck transport can assist in reducing damage or cracking. One option for truck dunnage is stiff Styrofoam. This material will slightly compress under load and will absorb some of the road shock transmitted to the precast component. Similarly, rubber dunnage planks can be used. Dunnage can also be applied to the sides or top of products to prevent products from rubbing against each other and fill any voids to protect them from tie-down chains or cables.

PLACEMENT AND STACKING

The ability to stack precast inventory without damage frees up valuable storage space for more production and is one of the greatest economic paybacks with good dunnage practices. The correct placement of dunnage requires careful analysis whether it is an individual product or a stack of products. In most cases, the best location to place dunnage is at or very near the position of the designed embedded lifting device inserts. For many precast products, dunnage placed at this location results in similar stresses on the product to those anticipated during lifting and installation.

The most common dunnage configuration is to provide four dunnage pads in the corners of a rectangular section or two full-length dunnage boards creating a simple span for the stacked products. Though rules of thumb need to be reviewed to ensure applicability for stacking precast panels, the “fifth-point rule” is a common placement method of full-length dunnage. This rule places the dunnage approximately one fifth of the section length or width in from the edge on both sides, leaving 3/5 the product length or width between the two boards. Should a third dunnage member need to be applied, careful attention should be given to ensure all the dunnage boards are equally level and at the same elevation to eliminate any high or low spots.

Similarly, stacked component dunnage should be carefully aligned with each preceding level of dunnage, and the components themselves should be in alignment without individual components overhanging the others.

The NPCA QC Manual, section 4.8.3 reads, “Products shall be stored in a manner that will minimize damage caused by uneven bearing, improperly located dunnage blocks, stacking products too high or difficulty in handling.” The permissible stacking height is to be determined by the QC personnel or engineer after analyzing the dunnage bearing area requirements and soil bearing capacity described earlier, in addition to forklift height safe accessibility and stack stability. The stack stability will require additional analysis. In general, the stack height should not be greater than twice the component base width, unless specifically designed and documented. It is important to have a written stacking policy and train plant personnel on proper stacking and dunnage placement and related safety hazards of improper stacking or changing conditions in the stacking area.

THE FINAL WORD ON DUNNAGE

While you may not give much consideration to dunnage on a day-to-day

basis, as long as you are manufacturing, storing and shipping products, you are truly never done with dunnage. Review your current precast concrete product storage plans to make sure you are employing the best methods for safe, damage free, and easily accessible storage of finished and received products. And ensure your workforce is trained to properly apply those methods each and every day. **PI**

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

RESOURCES:

- 1 American Concrete Institute ACI 318-14 Building Code Requirement for Structural Concrete
- 2 Recommended Practice for Precast Prestressed Concrete Composite Bridge Deck Panels, Ross Bryan Associates, March/April 1988 PCI Journal
- 3 NPCA Quality Control Manual for Precast Concrete Plants, 13th Edition

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Under the Microscope: Cement, ASR and DEF

A closer look at three broad topics better explained at the microscopic level.

NPCA Staff Report

In the classic 1957 science-fiction film “The Incredible Shrinking Man,” the lead actor’s diminutive stature leads to a fight for survival. Stairsteps become towering cliff faces. Patches of grass transform into dense forests. Harmless spiders become terrifying beasts.

While you likely aren’t planning to shrink down anytime soon, thinking about concrete at the microscopic level will change the way you look at it.

Calcium hydroxide magnified

Credit: Farnam's Research Group at Drexel University, Drexel Advanced and Sustainable Infrastructure Materials Lab

CEMENT CHEMISTRY

Like any great recipe, special care must be taken with the ingredients that go into cement. Typical

Type I portland cement is composed of five main components: calcium, iron, silica, alumina and sulfate. These can come from a variety of natural sources such as limestone, clay, iron ore, shale and gypsum. However, industrial byproducts such as fly ash or slag may also be used. The ancient Romans and Egyptians even crushed seashells and snail shells and added them to concrete mixes to provide sufficient calcium and lime.

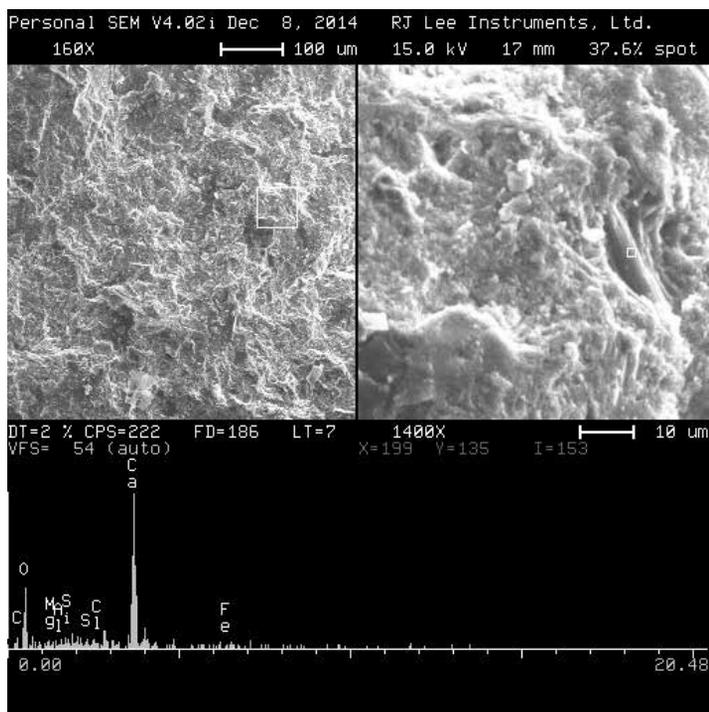
What really matters is that the necessary amounts make it into the mix. ASTM C150, “Standard Specification for Portland Cement,” lists cement composition requirements and physical requirements along with applicable test methods for different types of cement.

For example, Type I cement does not have a maximum aluminum oxide content; however, Type II limits the content to 6% by mass. By varying the proportions and ingredients, cements are designed to perform differently for different concreting applications and environments.

The selected cement materials are crushed and ground into the appropriate size, and then proportioned and blended. After this, the components are heated in a cement kiln at an extremely high temperature. When the materials reach 2,550-to-2,800 F, a chemical reaction occurs, and the calcium carbonate decomposes into two new compounds: carbon dioxide and calcium oxide. The calcium oxide then combines with other materials in the kiln to form the compounds of clinker: tricalcium silicate (alite), dicalcium silicate (belite), tricalcium aluminate and tetracalcium aluminoferrite.

All the reactions taking place inside the kiln are important, but for precasters especially, it is the alite and belite that are key. Alite, or C_3S , makes up roughly 50-to-70% of the clinker and is a light-colored, hexagonal crystal. It reacts with water to produce calcium silicate hydrate, or CSH, which is the compound that binds paste together. Thanks to its quick reaction with water, alite is largely responsible for concrete’s early strength gain. Belite, or C_2S , constitutes 10-to-25% of the clinker. Like alite, belite reacts with water to create CSH. In addition to the formation of CSH, alite and belite reactions also produce calcium hydroxide, or CH, which can contribute to some durability issues if exposed to harmful elements.

Besides the alite and belite, the tricalcium aluminate



undergoes several reactions and can create ettringite, calcium monosulfoaluminate and tetracalcium aluminate hydrate. These products contribute little to strength, but can have a significant impact on setting times.

ALKALI-SILICA REACTIVITY

While not exceedingly common, alkali-silica reactions have contributed to some field durability issues. ASR occurs when alkali hydroxides in concrete react with certain reactive silicas in aggregates and form an alkali silica gel. The gel tries to soak up as much water as it can, causing it to expand inside the concrete. The uneven expansion caused by ASR can have several negative effects on concrete, foremost of which is cracks in the aggregate and the surrounding cement paste. This will immediately lower the compressive and tensile strengths of the concrete and result in other deleterious effects on the structure.



For example, the Seabrook Station Nuclear Power Plant in Seabrook, N.H., opened in 1990. By 2012, ASR was observed in some of the concrete at the plant. Testing revealed the concrete lost 22% of its original strength.¹ Thankfully, steps have been taken to combat the ASR at Seabrook, but how can we prevent it from occurring in the first place?

First and foremost, aggregates should be carefully selected to limit reactive silica content. High levels of reactive silica are usually found in types of volcanic rock or in siliceous sand. You can avoid this issue by ensuring your aggregates comply with the requirements of ASTM C33, “Standard Specification for Concrete Aggregates.” This ASTM standard will indicate whether the aggregate supplied has reactivity potential and whether additional ASR testing is required.

It may sound counterintuitive, but one of the best ways to combat ASR is to actually introduce some silicas into the mix. Fly ash is a common supplementary cementitious material that will react with the calcium hydroxide in the concrete to create extra CSH. This helps prevent a future ASR and can also increase the strength of the concrete.

DELAYED ETTRINGITE FORMATION

Similar to ASR, delayed ettringite formation, commonly known as DEF, refers to expansion and cracking and is caused when early-age ettringite formation is slowed. Ettringite is a long, thin mineral that forms when tricalcium aluminate reacts with gypsum and water, and it is a normal part of cement-hydration reactions. Ettringite formation usually occurs in the first few hours of hydration and is spread uniformly throughout the paste. This early-age ettringite is important because it will consume sulfates in the cement and also aids in stiffening the mix.

When concrete is cured at temperatures between 158 F and 212 F, the primary ettringite formation is disrupted and monosulfoaluminate forms instead.² As the concrete cools, the monosulfoaluminate will slowly begin to transform into ettringite. Over the next few years, pressure in the paste will build as the ettringite begins to expand outward from the monosulfoaluminate and cause the paste to separate from the aggregates.

Delayed ettringite formation is not normally caused by curing on a hot day; rather it is attributed more to accelerated curing procedures that can reach these high ambient temperatures. Be sure to follow the curing procedures carefully – including beginning the accelerated curing procedures after the concrete has reached initial set, as well as following the guidelines for ambient temperature, concrete temperature and curing duration.

Ettringite formation magnified

Credit: Farnam's Research Group at Drexel University, Drexel Advanced and Sustainable Infrastructure Materials Lab

UNDER THE MICROSCOPE

From raw materials to the final product, few people in the precast industry get a chance to see what happens under a microscope. Becoming familiar with some of the challenges that aren't immediately visible can help provide macro-scale answers and solutions to issues that arise on the microscopic level. **PI**

RESOURCES:

¹ http://archive.boston.com/news/local/new_hampshire/articles/2012/02/09/local_leaders_question_safety_of_seabrook_power_plant/

² PCA Design and Control of Concrete Mixtures, 15th Edition, pg. 221



One way precasters can maintain concrete temperature control during the summer is by misting aggregate stockpiles with water.

NPCA file photo

CONCRETE MIX DESIGN: **Controlling Temperature and Time**

Intentionally inducing DEF in a laboratory – an experiment for QC managers

By Frank Bowen

Editor's Note: This is the fourth article in a year-long series that explores the science of concrete to provide a better understanding of mix design. The series is collaboratively written by Paul Ramsburg, technical sales specialist at Sika Corp., and Frank Bowen, business development representative with Rosetta Hardscapes.

Author's Note: Before we dive into this, I invite you to read ACI 305, "Guide to Hot Weather Concreting," and ACI 306, "Guide to Cold Weather Concreting," as well as sections 4.4.6, "Hot Weather Precautions," and 4.4.7, "Cold Weather Precautions," in the NPCA Quality Control Manual for Precast Concrete Plants. In addition to these guidelines, I also suggest you read the article "Thermal Shock of Concrete" by Kayla Hanson, published in the July-August 2016 issue of Precast Inc. To avoid any redundancy and to keep you riveted, I would prefer to introduce new ideas and concepts rather than repeat what was already covered in a conclusive editorial. In her article, Hanson reviews the bulk of the casting and curing rules we should be following regarding temperature regulation while manufacturing precast concrete. My article, however, is intended for readers who want to break those rules and learn from their findings.

As we find ourselves in the peak of summer's heat, it's a good time to review the production and curing practices in our facilities. Temperature limits – even though I am about to ask you to cross them – are set in place for a very good reason. As precasters, we need to cast our forms constantly to remain profitable. Time is money, and labor isn't cheap. Therefore, we want to produce as many castings as possible in the shortest amount of time allowed. This is where we can run into serious problems, especially if we are not careful of our constraints. Production teams who are more focused on the number of units produced than the quality of units produced can risk the dangers of delayed ettringite formation (DEF) if proper mitigation techniques are not employed.

TIME CAN BE ON YOUR SIDE

“We need to pour those forms twice a day!” We have all heard this before. Accelerating admixtures, shorter curing cycles and rapid-paced manufacturing are tools that bring precasters the efficiency they crave. But what happens if we reach the limits of what we can produce and fall behind schedule? When construction projects go ahead of the planned schedule, praise is often given to suppliers and manufacturers. The “behind the scenes” production time we provide our customers will always be a factor in our bids to improve our share of work. Time, as it constantly reminds us, is without break and more valuable each day we press on. When deadlines approach and we find ourselves behind schedule, cheating time can become increasingly appealing. But if we stick to a few simple rules, we can plan for things to go exactly as we hope.

THE PROBLEM

What is the problem I am addressing in this article, what is it caused by and how do we avoid it? Too much heat during curing of concrete can cause DEF but it can be avoided by following American Concrete Institute and National Precast Concrete Association guidelines. Let's look at what is happening in the curing stages of a precast casting.

I define the stages of precast curing in four categories. The first is a well-known category called “initial set.” Initial set is defined as the time from when concrete is placed and finished to the point it takes 500 psi to penetrate the mortar 1 inch per ASTM C403, “Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.” This stage is easily monitored by means of a penetrometer and can help us determine when we can introduce additional curing techniques. The second stage of curing is from the point at which concrete reaches handling strength. I call this stage “initial cure.” It's during this stage that it becomes more reliant on the quality control manager's tacit knowledge than his or her explicit knowledge to predict the time it takes to achieve this point. This is because many penetrometers are accurate only from about 100 psi up to about 700 psi. Most of the current hydraulic strength testing machines are not deemed accurate for testing results below 1,500 psi on 4-inch specimens. This leaves a gap between testing for strengths between 700 psi and 1,500 psi that is best understood by years of casting, recording and analyzing set time data.

PRO TIP:

In general, we need the concrete to achieve the designated stripping strength before we can lift it out of the form. This, of course, is dependent on the thickness of the member, the mass of the member, the lifting devices used and numerous other variables. Each casting should be analyzed properly to determine stripping, lifting and handling strength limits. Some castings may need less, some may need more. Conclusive internal testing is the only way to prove a member is ready to be removed from the form.

Once at least three 4-inch cylinders are tested – I recommend casting one additional cylinder for the stripping-strength test, so you can break one early to get an estimate of the load increase – and recorded within the range limits of the designated stripping strength, the casting can then be moved from the form, post-finished, labeled and moved to its third stage of curing. I refer to this stage as the “production plant cure.” This is the stage where the casting is moved to an area where further curing can take place. The final stage of the cure is after the casting is installed in what I refer to as the “on-site/installed cure.”

For this article, I want to address the two most important stages of curing to a precaster regarding the economy of form production cycle times, initial set and initial cure. But please allow me to digress for just a moment to make sure that you have addressed a couple of cost-saving measures prior to diving into an all-out thermal assault on your concrete castings.

THE PROCESS

There are numerous ways to increase throughput in a precast plant. Some options, such as purchasing more forms or adding a new batch plant/building are not always viable. When this is not an option, it forces us to consider improving our output by decreasing existing production cycle times. This was the driving factor for the creation of dry-cast concrete manufacturing. Regarding wet-cast operations, I suggest continued lean review.

First and foremost, find your waste – most of it will be found in lost time – exploit it, correct it and teach others how to sustain the change. When applying the lean methodology to production of precast, observe the crew's habits and process flow to see how long it takes to complete a given task. Do this to reevaluate the plant layout and, specifically, the steps and distances used in the process. There is free money on every plant floor if you know where to look. The most effective way to maximize efficiency at a precast plant is by adding a properly functioning second, or even, third shift. Adding an evening production crew eliminates the underutilized downtime in a manufacturing plant. This isn't always an easy process to implement and usually requires a great deal of management attention to coordinate the two shifts. If your customer demand increases and you want to use more of what you already own, by all means, keep trying to achieve this goal, regardless of the constraints you encounter.

Now, let's get back to understanding concrete temperature in a rapid-cycle production facility.

In a very brief synopsis, here are six key notes from NPCA's QC Manual regarding temperature limits found in sections 4.3.5 and 4.3.6.

IN COLD WEATHER CONDITIONS:

1. Avoid adding freezing aggregates to the mix.
2. Water at temperatures exceeding 180 degrees Fahrenheit should never be introduced to the mixer.
3. Fresh concrete temperature at the time of placing should be between 45 and 90 F. If heat or steam is used to assist in curing, initial set should be achieved prior to the introduction of heat and/or steam.
4. For this, initial set should be recorded at a minimum of once per month, per mix design to verify when the heat and/or steam can be introduced.
5. When accelerated curing is implemented, the rate of temperature rise should be monitored closely and never be allowed to exceed 40 F per hour. On a micro level, while monitoring a digital temperature gauge that shows accuracy to a tenth of a degree, this would average about 9 seconds between each tenth of a degree increase.
6. The maximum internal temperature of the concrete should never exceed 150 degrees during the cure unless DEF mitigation procedures are employed. See the commentary in the NPCA QC Manual on pages 59 and 60 for a few options suggested to mitigate DEF in higher cure temperatures.

★ PRO TIP

Keep in mind that when steam curing in your plant, auditors for the NPCA Plant Certification program will consider the intent of the added heat being introduced into your plant when judging if internal thermal recording is necessary. For example, turning up the heat on a central air thermostat that operates the plant's overall ambient temperature may not be considered intentionally increasing the curing temperature. On the other hand, pointing the hot end of a torpedo heater in the direction of a precast form should show the intent of the added heat as a pre-planned process to accelerate the cure, thereby requiring proper internal monitoring.

During the initial set, the chemical reaction of hydration begins, and as the earliest formations of crystalline silica develop, it is critical the casting is protected from handling,

moving or vibrating. The newly developed matrix is as fragile in this stage as it ever will be. After an initial release of increased heat, crystallization proceeds slowly with a period of low heat evolution. Depending on the casting shape and function of the form, demolding an outer form wall may be possible in only a couple hours and before even 500 psi is achieved, but it is inherently risky.

In the second part of the cure, which usually takes place overnight in a precast plant, a tremendous increase in heat of hydration takes place.

"There's nothing like seeing the steam release and feeling the surface of a casting as the form is pulled opened the morning after placing concrete," said Gary Knight of Lehigh Cement Co.

For the next couple of days, this concrete will have a rapid rate of increasing strength. At the early stage of hydration, the most soluble phases, tricalcium aluminate and tricalcium silicate, react first and contribute to initial set and early strength. At this stage, regulated temperatures at the upper end of the limits previously mentioned and maximum humidity provide the ideal environment (short of adding atmospheric pressure) to ensure this concrete reaches its strength and durability potential.

THE EXPERIMENT

It is now, during these two stages, I challenge you to break some rules (in the lab, of course). Specifically, I encourage you to break the maximum temperature limits, but test as many variables as you wish, so long as they are isolated for each experiment. To better understand the effects of curing in optimal, standard and substandard conditions, here is my recommended experiment in which you can intentionally induce DEF.

- Cast 22 test cylinders from a mix design used in your plant. Though it is not necessary for this experiment to work, choose a mix design, if available, that has no supplementary cementitious materials, uses Type 3 cement and is chemically accelerated. Try to have the fresh concrete temperature close to 90 F when placing it in the test cylinders. This would provide the most dramatic results.
- Cure six cylinders as you normally would for standard issue, in-house testing requirements, two for stripping strength breaks (let's stay consistent here at 24 hours), two in the 73.5-degree F tank for 7-day breaks, and two in the 73.5-degree F tank for 28-day breaks. These are your control specimens. Compare all results to these breaks.
 - Now, take 10 cylinders, directly after casting while the concrete is still in a fresh state, and immediately cure them in a controlled environment with 100% humidity at 200 F for 23 hours. After these sit for 23 hours, remove the cylinders from their molds, let them cool to 73.5 F in the 24th hour and keep them in a dry environment. Leave them exposed on the lab room



counter if the lab can maintain a reasonable ambient temperature around 73.5 F.

- Break two at 24 hours. At the 4-day mark, place four cylinders back in the tank, break two at seven days and two at 28 days.
- Leave four cylinders on the counter, break two at seven days and two at 28 days.
- Take the remaining six cylinders through an optimal cure process. After casting, place two in a 100% humidity, 90 F environment until the predetermined initial set time of this specific mix under similar conditions. Once initial set has taken place, increase the ambient cure temperature at an even rate of 10 degrees every 15 minutes, for the next 90 minutes until the temperature is at 150 F and maintaining 100% humidity. In this environment, cure two of the cylinders for about 20 hours (just before the 24-hour break point allowing the cylinders to cool for handling at 73.5 F), two for 7-day breaks, and two for 28-day breaks.
- You will find, of course, that you can demold at record speed when overheating a casting during initial set. However, the problem in doing so is that moisture loss from the heat increase prevents the formation of calcium silicate hydrate, and this shuts down the chemical reaction of hydration before it was complete. When you demold your cylinders, there may be nothing obvious in appearance, but problems are now buried in the premature matrix. The partial crystallization that has already developed and matured to set is

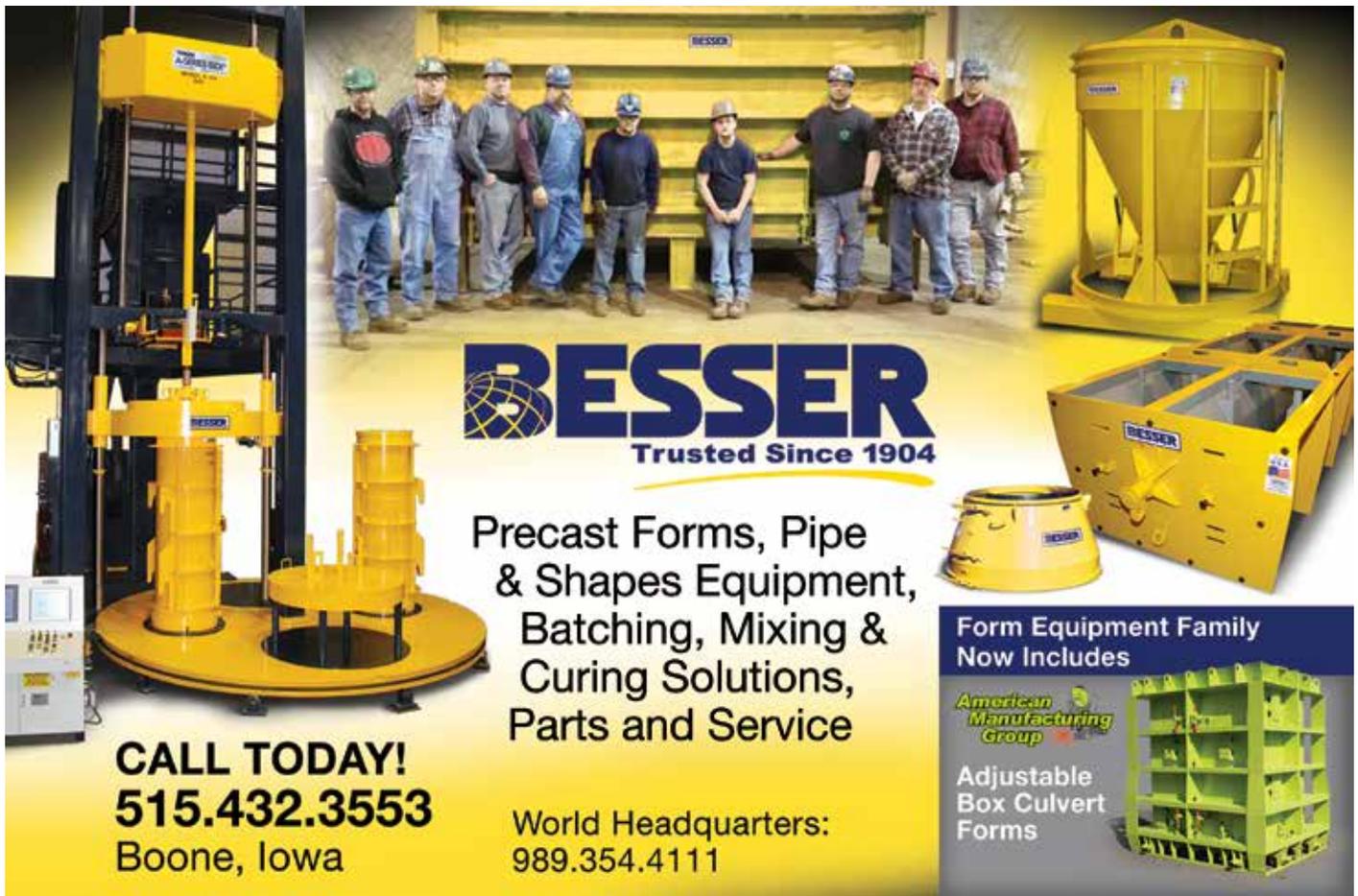
mixed among cement particles that have not yet begun to develop. What you have is a time bomb.

- The cylinders that were subjected to high heat early, left on the counter for four days, and then reintroduced to moisture should experience the expansive cracking that results from the delayed formation of the mineral ettringite. With high early heat in excess of the prescribed limit, ettringite, which is a normal product of early cement hydration, is choked off from development at the stage in its life when it is needed the most.

THE LESSON

Reading about this experiment may be helpful, but seeing it first hand and training a QC and production crew is even better. I hope you challenge your QC staff to test the limits and gain an understanding of accelerated curing techniques. There are great lessons learned by breaking the rules so long as these failures are recognized, and we learn from them. Failure is quite arguably a prerequisite to achieving success. **PI**

Frank Bowen, a 2013 Master Precaster graduate, received his M.B.A. from Middle Tennessee State University through the Concrete Industry Management graduate program in 2014 and is a business development representative with Rosetta Hardscapes in Charlevoix, Mich.



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HELPING
First-Time
Managers
SUCCEED
AND THRIVE

by Bridget McCrea

In order for first-time managers to buck the 50-60% failure rate and transition themselves into successful leaders, those who have been there and learned what works need to empower, mentor and guide them.

Brandy Rinkel doesn't think of herself as a boss. Rather, the assistant chief of operations for Wilbert Precast and manager of the firm's Yakima branch prefers to be seen as a teammate, even if it means having to roll up her sleeves and take out the trash, sweep the floor or just lend a sympathetic ear to an employee who is struggling with a personal challenge.



Brandy Rinkel

"I never ask someone to do a job that I wouldn't do," said Rinkel, who heads a 42-person team that includes office and plant employees. "However, if I need to flex that muscle and say to someone, 'Yes, I'm the boss and this is how things are going to be,' then I can. But I don't typically take that route unless it's absolutely necessary."

Rinkel, who is currently in the 2018 Leadership NPCA cohort, said she started her management career by overseeing just a handful of workers in the quality control department. When the Wilbert Precast management team was reorganized, she was promoted to manager of one of the firm's branch locations.

And with that, Rinkel found herself as a first-time manager of a sizable team. Because she had already been working with members of that team for several years, and had good working relationships with all of them, the transition went smoothly. That was, until it came time to learn how to tackle human resources duties like hiring, firing and promoting workers.

"No one really teaches you that kind of stuff," said Rinkel, who worked closely with Wilbert Precast's Spokane branch, where much of its HR operations are based. She recalls making a few, "Hey, I'm lost and I need help," phone calls to the HR staff in Spokane. "They were extremely helpful as I learned the ropes."

Looking back, Rinkel attributes much of her early management success to her willingness to ask questions and admit when she didn't know how to do something, and to the willingness of those she called to help her out.

"I really relied heavily on my coworkers and team members to help me get through those early stages," she said. "I also had to ask for patience and grace from my team members, all of whom were wonderful through the learning process."

Rinkel's participation in Leadership NPCA has also helped her become a more confident, strong leader. She feels she's getting a lot of great tips and tricks, and helpful feedback from the group leader and her peers, some of whom are just as new as she is, but some of whom have been managing people for years.

WHERE'S THE TRAINING?

As employees, we're taught to focus on accomplishing the tasks that are put in front of us. Leaders, on the other hand, must center their efforts on helping others complete their assignments in the most efficient and effective possible manner. This major mindset shift is just one of many obstacles that drives 50-60% of first-time managers back to being employees rather than leaders within one year of assuming their new roles.¹ Even worse, some of those unfit or unable to lead others remain in their leadership positions, adversely affecting those who now report to them and driving good talent away. Whether it's due to a lack of management training, the inability to effectively manage others, incompatible skillsets, or any other number of issues, these failure rates are both relevant and real in today's workforce.

Many of those failures can be attributed to a lack of training. According to CareerBuilder.com, for example, 58% of managers never receive any management training.

"Digest that for a second," David Sturt writes in 10 Shocking Workplace Stats You Need To Know. "Most managers in the workforce were promoted because they were good at what they did, and not necessarily good at making the people around them better. This statistic obviously unveils a harsh reality.

"We have a bunch of leaders who aren't trained on how to lead."



Jason Cross

At Norwalk Concrete Industries in Norwalk, Ohio, Jason Cross is an example of a successful manager who has worked his way up through the company over a 12-year period.

"I'm a high-effort guy, so I did my job to the best of my ability and, as a result, opportunities have come my way over the years," he said.

When one of those new opportunities involved management, Cross grabbed it by the horns. It didn't take long for him to realize there was a clear difference between working hard and leading. For example, he learned quickly that his team members were both his greatest asset and his greatest responsibility. And as a hard worker who knows how to do most tasks in the plant on his own, Cross realized that doing things himself isn't a good management model when you're leading a team of 50 people.

"Early on, I had a smaller team and actually was able to jump in and make things happen as needed, but now I'm just spread too thin," said Cross, who credits his strong faith in God, numerous NPCA classes, his bosses and participation in Leadership NPCA as factors that have helped boost his

What Does It Really Take to Manage?

As a former Fortune 1000 general manager who later became a management educator, Timothy G. Wiedman, a retired Doane University professor, has worked extensively with emerging leaders. He said these four traits tend to lend themselves to success in the field:

1. AN ENTHUSIASTIC ATTITUDE.

Enthusiasm can be infectious and thus improve the overall atmosphere in any organization – and that positively impacts one’s boss, colleagues, subordinates and customers alike.

2. A REPUTATION FOR DEPENDABILITY.

Whether it’s a work-related situation or a purely social function, successful people always seem to stick to timetables and meet deadlines. And if an unforeseen problem occurs, whenever feasible, they give people advanced notice about possible delays.

3. WHEN NECESSARY, A WILLINGNESS TO ASK FOR HELP.

If successful people do not understand something, they aren’t afraid to ask questions and seek advice. For example, a question that should have been asked but wasn’t can often have catastrophic consequences that will not soon be forgotten.

4. A WILLINGNESS TO ADMIT MISTAKES AND MAKE AMENDS.

When they’re in the wrong, successful managers are willing to admit it immediately. They don’t simply hope that their error went unnoticed. Then they volunteer to do whatever is necessary to make things right. All parties involved will remember and respect that type of integrity.

success as a manager. “I live by Colossians 3:23 (Whatever you do, work at it with all your heart...), and I take every relevant NPCA class that I can take.”

COMMUNICATE LIKE A BOSS

Knowing that a lack of qualified labor is one of the biggest issues that manufacturers are grappling with right now, and that good managers are in high demand, Liz Uram, author of *Communicate Like a Boss: Every Day Leadership Skills That Produce Real Results*, suggested precasters sharpen their pencils or risk having their new supervisors fall prey to the high failure rate statistic. Precasters that are looking to hire outside managers to oversee their production teams, for example, should start by listing out the specific tasks and responsibilities that the candidate will be handling (such as hiring and firing employees and creating schedules). This is a simple, yet important step, because in a lot of cases, people don’t actually know what they’re responsible for at work, Uram said.

The list will also help the interviewer ask job-specific questions that can be used with internal and external candidates, both of which should be vetted for experience, skillsets and potential leadership qualities. Use specific questions like, “How would you go about onboarding a



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new employee?” and “What steps would you take to boost employee morale in the plant?”

Pay especially close attention to how the management candidates feel about giving feedback and/or disciplining other employees, she said, and talk to them about what steps they would take to mitigate HR challenges such as an employee who repeatedly misses shifts or one who consistently falls short of expectations.

“It all begins with getting an understanding of what the new manager will be doing on a day-to-day basis, and making sure clear expectations are set right from day one,” Uram said.

Precasters should also consider pairing up a seasoned manager with a new supervisor in a mentoring-type relationship. In many cases, the two individuals can learn from one another. A younger, first-time manager, for instance, may be able to share his or her tech-savvy knowledge with a veteran manager who can give valuable insights into the tried-and-tested supervisory strategies.

YOU CAN'T DO IT ALL

Lisa Sansom, a leadership and organizational development coach and consultant at LVS Consulting in Denver, works often with first-time managers, helping them grow into their new roles. She said one of the biggest hurdles new managers have is delegation – a particularly difficult mindset to adopt when the new manager is a go-getter and doer. After all, that’s probably why he or she was promoted in the first place. As Cross recognized early in his new management role, telling others what to do instead of doing it yourself isn’t always easy.

“A lot of new managers just try to do everything themselves, and wind up picking up the slack for others versus training and supporting their team members’ efforts,” said Sansom, who tells managers to break out of this mold by recognizing that they just can’t do it all. “The best managers delegate. They also hold people accountable, talk to them about their performance and have those difficult conversations when needed.”

For precasters, Sansom said a good way to get started down the right path is identifying potential leaders early in their careers, and then giving them stretch assignments (like a project or task given to employees which is beyond their current knowledge or skills level) and mentoring them to determine whether there’s a fit.

“Don’t just promote people and send them onto training,” Sansom said. “It’s relatively easy to find a training program and spend a few thousand dollars to send someone to it, but that is just short-term intervention. And unless there’s some sort of support back in the workplace, like a mentoring program, you’re not really going to see any return from your investment.”

For first-time managers, Rinkel said it’s important to remember that any instant gratification you once got from completing your daily task will wane once you move into your new leadership role.

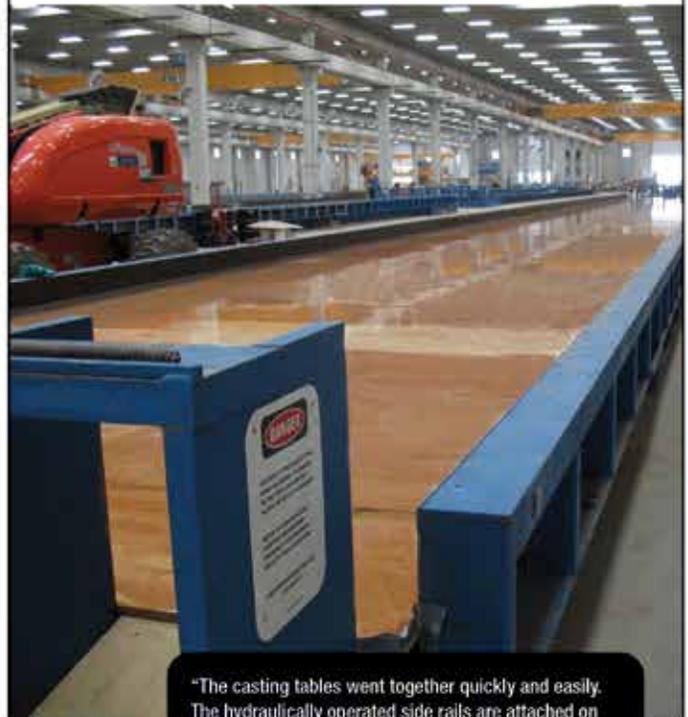
“Now, your team will be completing everything, so your personal wins will be smaller,” she said. “If your team doesn’t get its job done, then you don’t get your job done and no one wins.” **PI**

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

RESOURCES:

1 [Harmonics.ie/60-managers-fail-year](https://www.harmonics.ie/60-managers-fail-year)

7 HAMILTON FORM CREATES FUNCTION CASE STUDY Self-Stressing Architectural Table



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The Michie Family poses in front of Mixer No. 3, one of Michie Corporation's original mixers, during the company's 40th anniversary celebration in 2014.



THE EVOLUTION OF

MICHIE CORPORATION

For 44 years, the Michie family has been working to perfect its business. Now, the next generation will take its turn at the wheel.

by Matt Werner





W

hat does it take to start, grow, run and maintain a successful family business? The answer, of course, is it depends. There are constants: hard work, dedication and risk-taking, to name a few.

But variables such as location and personal decisions added in end up producing a completely unique end product.

The Michie family has spent the past 44 years refining their version of the family-run precast concrete company and today they have a thriving business situated on nearly 50 acres in Henniker, NH, to show for it. It has taken ingenuity and perseverance on the part of Al and Pamela Michie to position the company for future success. Now, as their kids, or G2 as they have collectively become known, get ready to lead the company forward, all eyes are on them to see how they will take it to the next level.

BUSINESS GROWS, EVOLVES

When Al talks about the history of the family business, it's a hardscrabble story not all that unlike the opening lines of Charles Dickens' famous novel, *A Tale of Two Cities*. However, from the grin on his face and the pride in his voice as he recalls what it took to get here, it's easily apparent the "worst of times" are easy to remember, but they really are part of the "best of times" and he wouldn't have had it any other way. Could he have done with a few less bumps in the road? Of course. But seeing the results of decades of toil he, his wife and their employees have put in is worth the sweat equity.

"You can sit here and talk about it and go on and on forever, but it's kind of a blink of an eye," he said. "It's been a lot of trial and tribulation, but with the people we have and the people we have had, that's what's made the place a success. Everybody holds up their end and everybody participates – everybody has to be a part of the game."

A DEMAND FOR PRECAST

The company's roots are in ready-mix concrete, but today precast makes up 75% of the family business. Back in the 80s, Al saw a market for precast in the area and knew Michie Corporation could provide it.

Longtime employee Steve Gard went from driving a mixer truck to a boom truck to the sales office as his role with the precast operation picked up. Today, he not only heads up the precast division, he is as close to a member of the Michie family as you can get without actually having the last name.

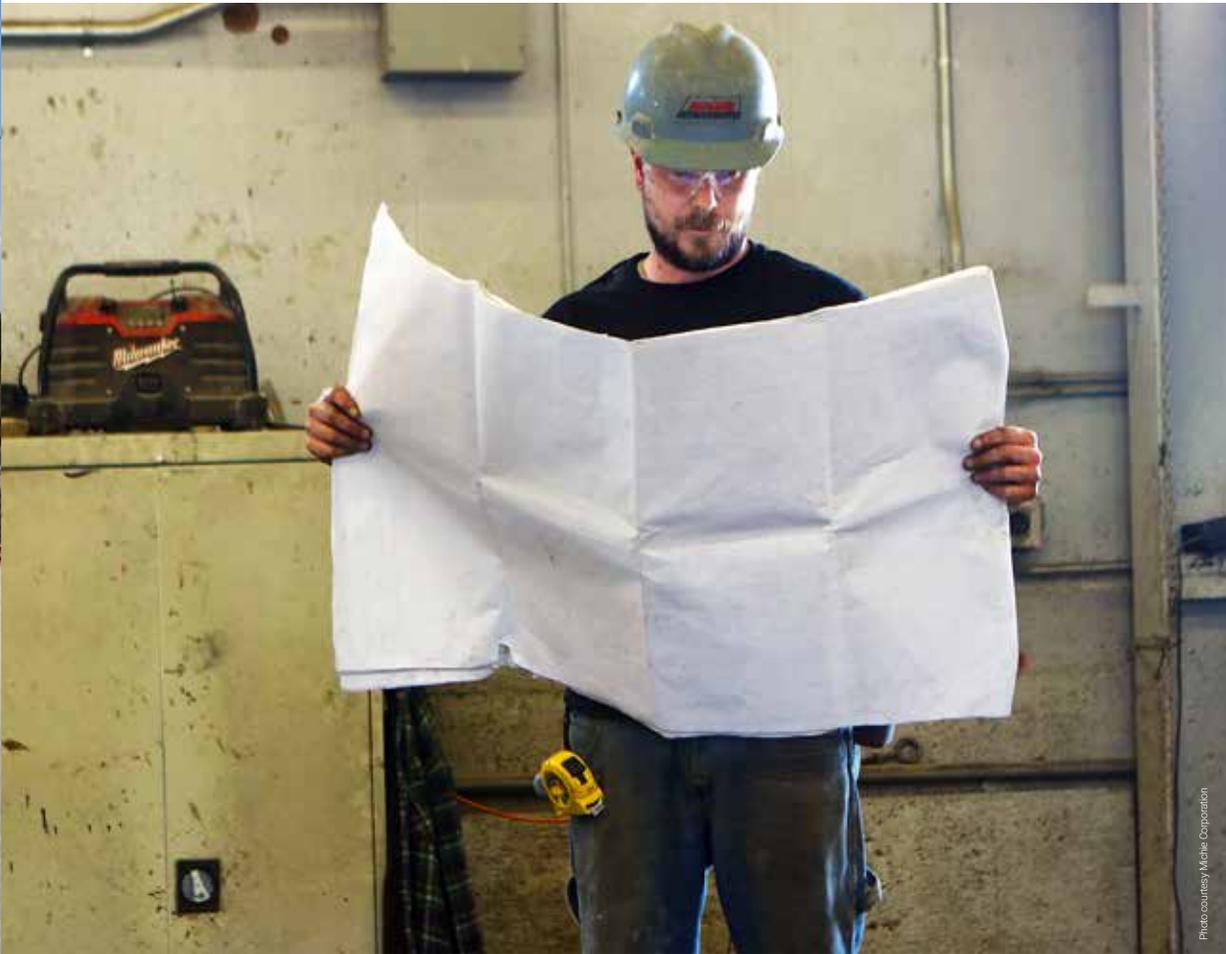


Photo courtesy Michie Corporation

“THIS WHOLE INDUSTRY – THE PRECAST AND THE PEOPLE IN HIGHWAY CONSTRUCTION – TO ME, THEY’RE THE **GREATEST PEOPLE TO DO BUSINESS WITH. THEY’RE ALL HARD WORKING AND JUST GOOD PEOPLE.”** *AL MICHIE*

“Steve is always leading by example, which was sometimes hard to follow because he’s very thorough and honest about what he does,” Al said.

Michie Corporation started off in precast producing items like septic tanks and manholes. At the time, it was really just to “keep the lights on,” Al said. However, as they built relationships with customers and agencies, they started getting requests, so they began manufacturing products such as box culverts. Gard said the company has never been afraid to tackle any job, but as he recalled the company’s first bridge project he can only laugh at bidding a 40-foot skewed bridge with parallelogram shaped sections.

The company has worked incessantly to not just grow their portfolio of products but to also establish the connections they needed to be successful.

“It’s amazing how you develop these relationships,” Al said. “This whole industry – the precast and the people in highway construction – to me, they’re the greatest people to do business with. They’re all hard working and just good people.”

As the operation grew, Al played a lot of roles, from building forms

and pouring concrete to running the company. But at the end of the day, he said he has never really seen himself as anything more than a truck driver.

“That’s who I am, and that’s what I do,” Al said. “I’ve done some other stuff along the way, but that’s what this whole place was made out of.”

Perhaps it’s that humble mentality that has helped the company not just endure but thrive. It has trickled down into his kids and his employees along the way.

“He’s instilled a drive in this company for just taking pride and ownership in what we do,” Gard said. “We’ll all jump in and do anything, because that’s what he’d do. That’s the way he is.”

“You have to clean the toilets every once in a while,” Al added with a chuckle. “Never think you’re too good to clean the toilets.”

THE NEXT GENERATION

Al and Pamela Michie have a lot to be proud of, but at the top of the list are their three children – Jason, Jessica and Johanna – who have now all taken an active role in the company. Al said he never forced his kids to go into the family business and all of them did, indeed, do other



Photo courtesy of Michie Corporation.

things earlier in their careers before returning to take a role with the company.

“I never tried to influence them or tell them what they ought to be doing,” Al said.

“The decisions they’ve made are decisions they’ve made on their own.”

Michie Corporation has always provided field assistance to ensure their products are installed correctly and the pieces fit together as designed.

Each of their children brings his or her own expertise and perspective to the family business. Jason, much like his father, is more than happy to get his hands dirty building a form and started hauling deliveries for the company as soon as he turned 18. His focus on production and efficiency ensure the company is firing on all cylinders in the plant. Jessica, the resident optimist of the family, has a vision

for the company that centers on culture and an endless drive to make Michie Corporation “a great place to work.” Her energy, passion and enthusiasm clearly rub off on those around her, including her siblings. Johanna, is keenly aware of the role the family plays in the success of the business. And when she talks about family she means every employee.

“We met with a bunch of our managers and told them we’re a family here, not just a business,” she said. “That’s what we strive for, to make everyone feel a part of the family.”

To accomplish this, Johanna said as people left they started focusing on personality in new hires. The goal was to hire people who will not only excel in their positions but who are also happy and easy-going people – people who want to be there.

In the office, Jessica and Johanna, have spent countless hours putting together a benefits package that shows their employees how much they care and how important they are to the company. They also plan fun all-staff outings to develop bonds between employees.

On the production side, Jason and Gard have been working to show employees just how important their jobs and the products they manufacture truly are. Seeing a set of plans or pouring a product doesn’t tell the whole story, so they take employees out to job sites to see the finished product. These field trips create a sense of ownership and pride and encourage employees to strive for the best quality and efficiency.

Together, all three have made a hard push for safety as well. Employees wear shirts with safety messaging emblazoned on them,



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Photo courtesy Michie Corporation

“WE HAD TO DO A LOT OF THINGS A CERTAIN WAY, AND THEN IT JUST BECOMES A PART OF OUR CULTURE. WE WANT TO HOLD OUR INDUSTRY TO A HIGH STANDARD, AND NPCA HELPS US DO THAT.” *JESSICA MICHIE*

the staff holds regular safety meetings and it’s a continuous topic of conversation.

“We’ve really worked hard on it the past few years, getting people to understand how important it is,” Jessica said. “It matters that people are safe and that they leave the way they came in – they have kids, grandkids, wives.”

“And it’s not just tooting the horn, it’s taking action,” Jason added. “It’s proper equipment, inspections and making sure everything is in top working condition.”

Although it requires a lot of time on their part, all three have seen the fruits of their labor.

“We’ve got the friendliest people working here right now – the best,” Jason said. “We’ve got really good people in every part of the company.”

FULL SERVICE

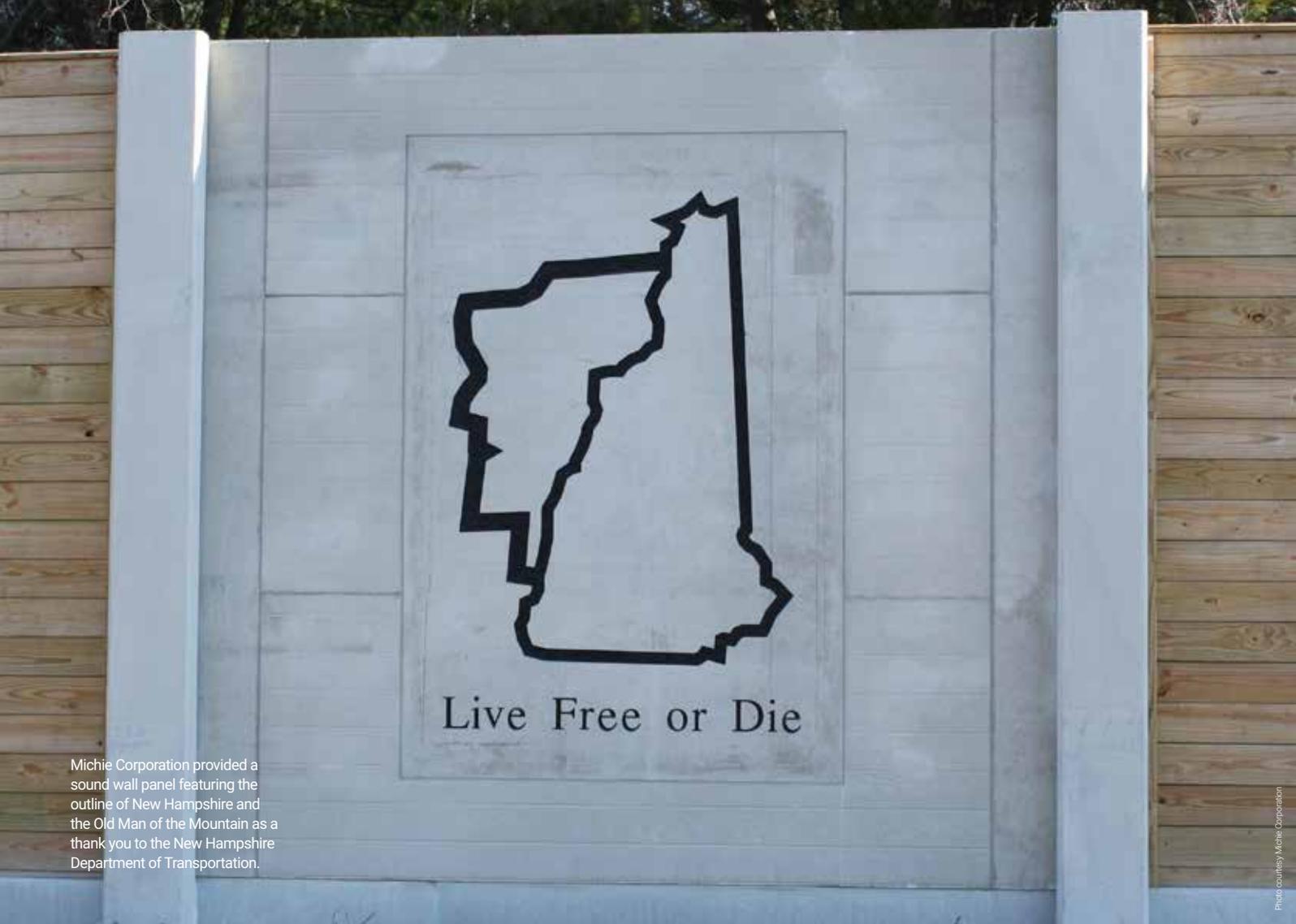
Something else Michie Corporation prides itself on is providing outstanding customer service. Jessica said they always keep their word and follow through with a job, even after products leave the plant. This includes providing field assistance for its products as needed to ensure

the pieces are installed properly and fit together correctly.

“You can’t just send the thing down the road and say, ‘Here it is; have at it!’” Jason said. “A lot of guys don’t know how to put the stuff together, at least at the frequency we do it, and you’re able to troubleshoot it and pick up little tricks.”

Gard said they have very loyal customers, and Michie Corporation does its best to show their appreciation. For example, the company manufactured a precast concrete sound wall panel for the New Hampshire Department of Transportation that had the state of New Hampshire’s outline as well as the iconic image of the Old Man of the Mountain etched into it. Gard said that the DOT currently uses precast sound wall posts and wood for the panels. Michie Corporation provided the precast panel as a thank you to the agency for the jobs it has awarded them throughout the years with the thought that these decorative precast panels may be used in other locations throughout the state.

As part of their company service model, quality is paramount as well. Michie Corporation has been an NPCA certified plant for 26 consecutive years and thrives on hearing customers, especially those who have seen thousands of precast products on jobs over the course



Michie Corporation provided a sound wall panel featuring the outline of New Hampshire and the Old Man of the Mountain as a thank you to the New Hampshire Department of Transportation.

Photo courtesy Michie Corporation

“WHAT KEEPS IT GOING TODAY IS OUR PEOPLE, ATTENTION TO SERVICE AND A QUALITY PRODUCT. I DON’T KNOW HOW EVERYBODY ELSE DOES IT, BUT THAT’S HOW WE’VE DONE IT.” AL MICHIE



NPCA/Albergo Photo

of their careers, compliment their products’ appearance.

“NPCA plant certification has been a wonderful guidance to where we’re at today in many ways,” Jessica said. “We had to do a lot of things a certain way, and then it just became a part of our culture. We want to hold our industry to a high standard, and NPCA helps us do that.”

The net result can be simply summed up as pride. The Michies are proud of their company, their product and their service. So proud in fact, that when they celebrated their 40th anniversary a number of years ago, they invited the entire town because they wanted people to come see what they do. Jason gave tours of the buildings and talked about how the products that leave their yard go all over New England.

Michie Corporation focuses on taking care of their employees and customers while creating a high quality product.

“It’s pretty impressive that what we do here can end up in a bridge near the Canadian border or the tunnel sections that are going into the Scarborough toll booth,” he said.

ACT TWO

As far as what’s next for the company, the Michies

are simultaneously attentive to the present and future.

“We want to focus on what we do now and do it really well,” Jessica said. “If there are other opportunities that come by and make sense, we would certainly look at that.”

“We’re paying attention to what we should be moving towards and what we should be pouring less of or shedding,” Jason added.

The three are in the process of buying the company and have hired a consultant to help with the transition. Between that work and the day-to-day of the business, they spend a lot of time together these days. It would be easy to develop family fatigue but, in fact, the opposite has happened. It has drawn them closer than ever and their time together at work is only a part of the story. Their families vacation together and they hold regular Friday night family pizza parties. The importance of getting along so well at work and in their personal lives is not lost on them.

“We’re like every family and have ups and downs but it’s pretty amazing,” Jessica said. “Most families are shocked that we spend that much time together and still like each other. I owe that all to my mom and my dad.”

“Even the guy we hired to handle the transition has been blown away that we get along this well, and he’s seen it all,” Jason added.

So what will keep the company growing into the future? Perhaps Al’s view of where the company has been and what has kept it successful so far contains the answer.

“It was all done through hard work and dedication,” he said. “What



keeps it going today is our people, attention to service and a quality product. I don’t know how everybody else does it, but that’s how we’ve done it.” PI

Matt Werner is the managing editor of Precast Solutions magazine and is NPCA’s communication manager.

Safety is a top priority at Michie Corporation, which has been an NPCA certified plant for 25 consecutive years.



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Need a Lift on Safety?

Understanding best practices and strategies for safely operating forklifts prevents accidents in the precast plant.

By Evan Gurley

Learning the **safe way** to operate a forklift and other powered industrial trucks is a vital part of safety training for precast plants.

Of all the industrial equipment available today, forklifts are arguably one of the most important tools for any precast plant. Whether indoors or outdoors, forklifts are vital in most precast operations and an integral part of our industry.

A forklift is a powerful tool when used by a well-trained operator, allowing workers to move and organize heavy materials in the precast plant and yard. However, forklifts can expose workers to serious hazards that can result in injuries and in some cases even death if precautions are not taken.

OSHA estimates 35,000 serious injuries and 62,000 non-serious injuries involving forklifts occur annually. Further, data from the Bureau of Labor Statistics shows 96 workers were killed in incidents involving forklifts in 2015.

OSHA estimates 11% of all forklifts are involved in accidents every year and that forklift injuries in general account for nearly 25% of injuries in the workplace. Many workplace accidents involve overturned forklifts or people being hit or run over by forklift trucks; typically, when the forklift is in reverse.

Learning the safe way to operate a forklift and other powered industrial trucks (PIT) is a vital part of safety training for precast plants.

WHAT IS A FORKLIFT?

Forklifts are regulated under OSHA's Powered Industrial Trucks Standard (29 CFR 1910.178). The rule includes safety requirements relating to fire protection, design, maintenance and use of forklifts and other specialized industrial trucks

powered by electric motors or internal combustion engines.

In a car or truck, the front wheels steer the vehicle. However, a forklift has the steering wheels in the rear. The rear end of the forklift swings in a circle around the front wheels that support most of the load.

A forklift works on the principle of a cantilever. A load on a beam (the forks) supported by a fulcrum (the front wheels) is counterbalanced by a weight on the other end of the beam (the forklift body and counterweight built into it).

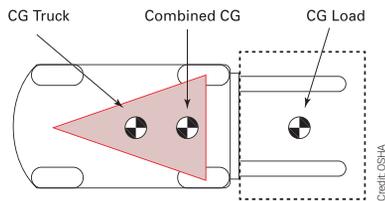
Whether the forklift will safely carry a load or tip forward can be determined by finding the moment about the fulcrum caused by the supported load. The moment equals the distance from the fulcrum to the center of gravity of the supported load multiplied by the weight of the supported load. If the moment of the forklift is greater than the load, then the forklift will safely carry the load. It is critical that all forklifts have a visible and legible capacity plate, and the operator comprehends the capacity limits of the vehicle.

As the load is raised, it becomes possible for the forklift to fall to the side as well as tip forward. The operator must consider the center of gravity of the forklift and load together. This combined center of gravity moves as the load is moved and as the forklift travels over surfaces that are rough or inclined.

Forklifts have a stability triangle. The sides of the triangle are formed by the center of each front wheel and the center of the rear wheel, or at the center of the axle, if there are two rear wheels. A vertical line extending from the center of gravity of the vehicle-load combination must be inside of the stability triangle to prevent the forklift from tipping forward, falling sideways or dropping its load.

The center of gravity of the forklift-load combination can move outside the stability triangle if:

- The load is picked up on the tip of the forks
- The load is tilted forward
- The load is tilted too far back when raised
- The load is wide
- Forklift movement causes the center of gravity to shift



The forklift will not tip over as long as the combined center of gravity of the truck and load system remains within the Stability Triangle.

These actions will have the following effects:

ACTION	CENTER OF GRAVITY MOVES
Tilting the load forward	Toward the front axle
Raising the load while tilting forward	
Driving on an incline with the load downhill	
Stopping forward travel or accelerating backward	
Tilting the load back	Toward the rear axle
Raising the load while tilted back	
Driving on an incline with the load uphill	
Accelerating forward or stopping backward travel	
Driving across an inclined surface	Toward the downhill side of the triangle
Driving across a rough or uneven surface	Toward the rut or low side of the triangle
Turning	Toward the side now facing the original direction of travel

Proper training to ensure each operator understands the dynamics of the forklift(s) they operate is a critical component to safety in the precast plant.

OSHA REQUIREMENTS

OSHA's Powered Industrial Trucks Standard (29 CFR 1910.178) establishes that each operator must be competent to operate a powered industrial truck safely, as

demonstrated by successfully completing the training and evaluation outlined in the standard.

OSHA requires training programs combine both formal instruction, such as lectures and written material, with practical training and a workplace performance evaluation. Each operator should be trained on the actual forklift that he/she will operate. As forklifts get larger, they operate differently. As you go from model to model, they operate differently. Operators should be mindful of the differences between various types and models of forklifts and lift trucks.

Forklift operators must follow safe operating rules at all times. Operators must always maintain control of the forklift, keep proper lookout and operate the forklift at speeds safe for the operation and worksite conditions.

OSHA highlights additional requirements and recommended practices in the following areas:

- Mounting and dismounting
- Starting/stopping
- Steering, turning, and changing direction
- Traveling on inclines
- Parking
- Safe travel practices
- Visibility
- Tipover

Mounting and dismounting

- Use three points of contact when mounting and dismounting
- Be sure that your hands are clean and dry to prevent slipping when grabbing handhold
- Grasp handhold and get a good grip. Never grab the steering wheel because it could cause you to lose balance if it moves.
- Wear appropriate footwear to prevent skids

Operating speed

OSHA does not have specific speed limits set for the safe operation of a powered industrial truck. However, OSHA addresses speeds in a few places:

- Under all travel conditions, the truck must operate at a speed that will permit it to be brought to a stop in a safe manner (29 CFR 1910.178(n)(8))
- The driver must slow down for wet and slippery floors (29 CFR 1910.178(n)(10))
- The driver must look in the direction of and keep a clear view of the path of travel (29 CFR 1910.178(n)(6))
- The driver must slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing. (29 CFR 1910.178(n)(4))
- While negotiating turns, speed shall be reduced to a safe level by turning the steering wheel in a smooth, sweeping motion (29 CFR 1910.178(n)(15))
- Grades shall be ascended or descended slowly (29 CFR 1910.178(n)(7))
- When ascending or descending grades in excess of 10%, loaded trucks shall be driven with the load upgrade (29 CFR 1910.178(n)(7))

Insight from Industry Q & A

Experts, manufacturers and precasters were asked several questions related to forklift safety. Below are the questions and answers from them.

What steps should precasters be taking to ensure forklifts are in good working condition?

1. Daily visual inspection of mast/forks, chain and hydraulic lines. Check fluids and look for leaks.
Jason Cross, general superintendent, Norwalk Concrete Industries
2. The best way for precasters to ensure that their forklifts are in good working condition is to either have regular preventive maintenance checks done by the manufacturer or follow the manufacturer's instructions on proper preventive maintenance.
Ed Hatcher, sales support, Hiab Sales & Service
3. Getting the manufacturer's operator/maintenance manual is a great start to ensuring their forklifts are in good condition. Then, follow the required/suggested maintenance schedule of the manufacturer. The third step is to institute a good daily forklift operator inspection form that can be reviewed by the facility maintenance staff and management.
Donald Graham, Safety Consultant, Safe T Pros
4. Heavy trucks demand more attention to the lifting chains, rollers and carriage due to the extreme load conditions to which trucks in precast operations are exposed. Lifting chains must be inspected daily, along with carriage integrity (no cracking) and the mast and carriage rollers to ensure all rollers are in place and working correctly. Further, the mast channels must also be inspected to ensure that rail flaring is not present. Finally, precast operations present a unique challenge in air filtration – all forklifts in precast operations must be fitted with combustion-air pre-cleaners, dual-element filters (when available), and micron filtration of the hydraulic oil.
Doug Atherton, KION North America Corporation- North American heavy truck sales manager
5. Daily forklift inspections by operators and monthly inspections by maintenance crew.
Ron Sparks, Columbia Precast Products
6. A good preventive maintenance (PM) program will help companies keep their powered industrial trucks running and in safe condition. A proactive PM program will ensure the equipment is properly maintained and serviced on regular intervals to prevent unnecessary down time and issues that could potentially lead to safety hazards.

Daily or pre-shift inspections are not only required by OSHA regulations, but they are also important to ensure the operator is aware of any potential safety-related issues prior to operating the PIT. It is also important to have a workflow in place to ensure any deficiencies found during the inspection are communicated to the maintenance department, so repairs can be made promptly.
Michael Cunningham, Oldcastle Precast, EH&S compliance manager
7. A couple of the most important steps are daily maintenance and safety checks. These should be done right at the beginning of the shift to ensure proper and safe use. Employers need to educate and train all employees using them.
Justin Weberg, Dalmaray Concrete Products Inc., plant manager

What are some safety precautions precasters should keep in mind when working with and around forklifts?

1. Since most accidents with forklifts happen getting on and off the forklift, always use the three-point contact method where three limbs are in contact at all times.
Ed Hatcher
2. The rated load capacity of any forklift is critical. I have seen forklifts that have the load capacity painted on the mast of the lift, but when the data plate is reviewed the rated capacity was less than the manufacturer intended.

Next is modification of the lift in any way. Many times, holes are drilled in the forklift tines or cracks are welded. These are modifications to the lift according to OSHA and the manufacturer. Modifications are only allowed if you obtain written approval from the manufacturer.
Donald Graham
3. While lifting large loads, spotters should be used to ensure that pedestrians are clear of the load. Spotters must never be under or within the fall area of a load. Approved concrete lifting devices must be used in conjunction with the proper mast and carriage configuration. Never lift heavy loads with a single fork – securely place a load on both forks with the load fully against the backrest of the carriage. Never lift heavy loads with the tip of the forks. Follow the weight capacity guidelines that are posted on the data plate of all forklifts.
Doug Atherton
4. Red light that shoots a beam in front (10-to-15 feet) of a lift in either direction (forward or backward) so employees can see the forklift coming before they actually see the forklift is a good safety precaution.
Ron Sparks
5. Keeping employees and pedestrians an adequate distance from operating forklifts is a must. Complete risk assessments to eliminate or reduce the use of PITs in the facility or while in close proximity to employees. When this isn't feasible, develop traffic control plans that will limit employee and PIT interaction.

Ensure all PIT operators are properly trained and certified. Training should include classroom, practical and operator evaluation to ensure employees are competent in operating the equipment. Training should be site- and equipment-specific. Involve all employees in PIT awareness training. Training should focus on pedestrian segregation and safe behaviors when interacting with PITs.
Michael Cunningham
6. When working with and around forklifts, be aware of your surroundings. There are a lot of blind spots with or without loads being carried. When operating a fork truck, the operator takes ownership in the safety of their coworkers and anyone else in their vicinity.
Justin Weberg

What are some safety features that you can incorporate into forklifts?

1. Mirrors, horns and back-up alarms.
Jason Cross
2. Make sure a good working seat belt is on the lift, the lift has daily inspection forms, and all the systems lights, emergency brake and gauges are in working order. Make sure the operator's seat is in good condition and not damaged. Also, make sure the forklift is not modified in any way without the manufacturer's written authorization.
Donald Graham
3. I'd suggest a load-sensing device that provides basic load weights while lifting, light safety warning indicators and a rearview/reverse camera.
Doug Atherton
4. BEEPERS, noise-making devices and additional mirrors.
Ron Sparks
5. Speed-limiting devices – only allows operators to drive up to certain speeds – and blue pedestrian safety warning spotlights.
Michael Cunningham

What are actions you see employees doing when working on forklifts that they should not be doing?

1. Texting and/or talking on cell phones! If the operator needs to take a call, they should stop, put the forklift in neutral and set parking brake.
Jason Cross
2. Not wearing their seatbelt or engaging it behind them to get around the default when not engaging it, allowing others to ride on the forklift, or purposely trying to lift more than the load chart of the forklift.
Ed Hatcher
3. The most common is not wearing a seatbelt when operating the lift. The next is overloading the lift, then putting blast on the counter weight to keep the lift in balance. The third is speed in the yard. Many operators drive too fast for the conditions that they face each day.
Donald Graham
4. Adding additional counterweight – this is forbidden, yet still done in some applications, lifting loads that are not placed against the backrest of the fork carriage, allowing passengers to ride in the cab and driving without safety belts.
Doug Atherton
5. Driving too fast is probably the No. 1 issue.
Ron Sparks
6. The main issue when it comes to employee interaction with PITs is complacency. Employees get used to working with and around this large equipment, which leads to at-risk behaviors such as working too closely to the equipment or not being aware of the equipment when it passes by.
Michael Cunningham
7. The two biggest problems that we have are riding double and talking on the phone.
Justin Weberg



Steering, turning and changing direction

- Come to a complete stop before changing directions
- Use a horn or warning light to warn pedestrians when reversing
- Keep a clear view
- Look in the direction of travel. When reversing, look behind.
- Beware of limited visibility and use extreme caution when driving in reverse
- Consider the use of ground guides, rearview mirrors, spotters or other aids to increase visibility
- Do not assume pedestrians or bystanders are able to hear a back-up alarm
- Allow plenty of room for pedestrians
- Never assume pedestrians are aware of the presence of heavy equipment and the intended direction of travel
- Anticipate the rear-end swing and start the turn as close to the inside corner as possible
- Plan your route and anticipate turns
- Never turn with forks elevated
- Never turn on grade

Traveling on inclines

- Drive loaded trucks forward going up a ramp
- Always drive unloaded trucks with the forks downgrade
- Never drive with the load downgrade

Starting/stopping/parking

A powered industrial truck is considered unattended when the operator is 25 feet or more away from the vehicle, even if the forklift remains in view. A forklift is also considered unattended when the operator leaves the vehicle and it is not in view.

- Apply brake slowly and stop
- Neutralize the controls
- Set the parking brake and turn off the ignition
- Select an area to park. Do not park in an unauthorized area. Do not block an aisle or exits. Follow your company's parking procedures.
- Do not park on grade, unless wheels are blocked
- Fully engage the parking brake
- Lower the load fully
- Neutralize the controls
- Tilt the mast forward slightly and lower the forks to the floor
- Turn the key off and stop the engine. Remove the key.
- Use three points of contact to exit the vehicle

70%
of forklift
accidents
could have
been
avoided
with
standardized
training
and safety
procedures.
- OSHA

Safe travel practices

- Always look in all directions before proceeding
- Observe all traffic regulations, including authorized plant speed limits.
- Maintain a safe distance, approximately three truck lengths from the truck ahead, and keep truck under control at all times.
- Separate forklift and pedestrian traffic as much as possible.
- Never carry passengers
- Keep arms and legs inside the confines of your vehicle

Visibility

- In general, forklifts should have headlights if working at night, outdoors or in any area where additional lighting would improve visibility
- Add protective guard rails
- Add a warning track of yellow paint on the floor near dock openings
- Slow down and sound the horn at cross aisles and other locations where vision is obstructed

Tipover

In case of a tipover:

- Don't jump. Stay in the forklift.

- Hold tight to the steering wheel
- Brace feet
- Lean AWAY from the impact
- Lean forward

Training is key

According to OSHA, most injuries and property damage from forklifts can be attributed to three causes:

- Insufficient or inadequate forklift training
- Failure to follow safe forklift operating procedures
- Lack of safety rule enforcement

For those who operate forklifts, there comes a great deal of responsibility to safely operate the equipment and prevent injury. Often, simple mistakes such as speeding or not wearing your seatbelt can lead to serious injuries. OSHA also states that 70% of forklift accidents could have been avoided with standardized training and safety procedures. An untrained forklift operator can be as dangerous as an unlicensed driver of a motor vehicle, so be sure to train all employees and enforce these rules as well as any company rules to keep all workers safe. **PI**

Evan Gurley is a technical services engineer with NPCA.

RESOURCES:

- 1 OSHA [29 CFR 1915.152(b)].
- 2 osha.gov/SLTC/controlhazardousenergy/

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Improving PRECAST SUSTAINABILITY

By Claude Goguen, PE., LEED AP

A sustainability software program is available for NPCA members to use for benchmarking sustainable development.

The NPCA Sustainability Committee has recently acquired a software program to help NPCA members determine how they are performing in terms of sustainability and monitor their progress through plant and process improvements.

Why is this important?

Depending on where you live, the topic of sustainability may be a hot topic or may rarely come up. In the precast concrete industry, the importance of sustainability is largely determined by geography. In some companies, it is rarely addressed. In others, it is embedded into the culture. Where it does come up consistently across North America is in colleges, universities and trade schools. Sustainability is now a part of engineering, architectural and construction curriculum in most institutions. These future specifiers are on board and recognize the value of sustainable development.

The American Society of Civil Engineers adopted a policy statement in 2016 that reads: Civil engineers shall be committed to the following ASCE Principles of Sustainable Development.

Principle 1 - Do the Right Project. Assessing the proposed project's economic, environmental and social effects on communities before proceeding with project.

Principle 2 - Do the Project Right. Engaging stakeholders and securing public understanding and acceptance of a project's economic, environmental and social costs and benefits. ASCE encourages its members to address sustainability holistically (from concept to demolition or reuse) rather than adding a variety of "green" features onto a conventional project.

ASCE supports the following steps to achieve a sustainable project:

Perform Life Cycle Assessment from Planning to Reuse - Project participants should use rigorous life cycle methodologies that quantify the economic, environmental and social effects of the project.

Use Resources Wisely - Minimize use of non-renewable resources. Sustainable development shall include progressive reductions in resource use for a given level of service and resiliency. The feasibility of restoration, or return of depleted resources, shall be evaluated by the civil engineer.

Plan for Resiliency - Sustainability requires planning for the impact natural and man-made disasters and changing conditions can have on economic, environmental and social resources.

Validate Application of Principles - Civil engineers must guide project development and validate the application of these principles by using metrics and rating tools such as the Envision Rating System for sustainable infrastructure.

All of this plays well for our industry, as precast concrete has a long life cycle due to its durability. It is made of recycled material and is available with locally sourced raw materials. And it is resilient – able to withstand disasters where many other materials would fail. Having the right data can help precasters show project owners and specifiers the sustainable properties inherent to precast and help win bids that might otherwise go to competing materials.

The point here is adopting and continually improving the sustainability of your product and operations will position you to take advantage of this growing marketplace. It can also save you money by

enhancing efficiencies in your operations. So, where do you start on this plan? Well, it's like starting a diet. You step on the scale and obtain your starting point, or benchmark. For sustainable performance, we have such a scale and we invite you to step onto it to begin the journey.

PLANT SUSTAINABILITY SOFTWARE

First, the Plant Sustainability Software tool is free to National Precast Concrete Association members. NPCA, the Canadian Precast/Prestressed Concrete Institute and the Precast/Prestressed Concrete Institute commissioned the Athena Institute to create this data-collecting and benchmarking tool. It is Microsoft Excel-based and will

work in versions 2007 or newer.

The spreadsheet can be used to quickly determine three environmental impact measures: global warming potential, primary energy consumption and water use. This will serve as a benchmark for each individual plant. Changes can then be monitored when implementing improvements in materials acquisition and production. The scope of the tool is cradle-to-gate with the "cradle" being the earth and the "gate" being the finished product ready for shipment from the precast plant.

It starts with entering data regarding cementitious materials sourcing and usage. Information on the material source location and

PORTLAND CEMENT SOURCES

IN THE YELLOW CELLS BELOW, ENTER THE TOTAL QUANTITIES, LOCATIONS AND TRANSPORTATION DISTANCES AND MODES OF CEMENT SOURCES FOR THE "PLANT INPUTS" WORKSHEET.

Define the location, masses and transportation modes and distances of each cement source.

One-Way Distance From Material Source to Plant by Transportation Mode

#	Material	Source Location	Amount	Units	Mass	Units	One-Way Distance From Material Source to Plant by Transportation Mode					Read This	Units
							Truck	Rail	Ocean	Barge			
1	Portland Cement Source #1	Illinois	1,200.00	short ton	1,200.00	short ton	35.00	120.00				MS	mile
2	Portland Cement Source #2	Insert Location		short ton	0.00	short ton						MS	mile
3	Portland Cement Source #3	Insert Location		short ton	0.00	short ton						MS	mile
4	Portland Cement Source #4	Insert Location		short ton	0.00	short ton						MS	mile
					Total	1,200.00	short ton	35.00	120.00	0.00	0.00		

Figure 1: Example of data entry for portland cement.

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Non-verified Environmental Impacts Total Plant Per Short Ton of Precast		
Category Indicator	Unit	Benchmark Result
Global Warming Potential (GWP)	kg CO ₂ equiv	198.5
Acidification Potential	kg SO ₂ equiv	3.6
Eutrophication Potential	kg N equiv	0.4
Smog Creation Potential	kg O ₃ equiv	42.7
Ozone Depletion Potential	kgCFC-11 equiv	3.7E-06
Total Primary Energy Consumption	MJ (HHV)	1,812.1
Non-renewable Energy Resources	MJ (HHV)	1,749.1
Renewable Energy Resources	MJ (HHV)	63.0
Material Resources Consumption	kg	791.3
Non-Renewable Material Resources	kg	790.1
Renewal Material Resources	kg	1.2
Net Fresh Water	litre	1,012.0
Non-hazardous Waste Generated	kg	70.4
Hazardous Waste Generated	lg	26.4

Figure 2: Example of non-verified EPD generated in sustainable plant tool.

Data Input is 100% Complete		
Principal Results Summary Reporting Period: Plant 3000 Q1 2017	Total	Per Short Ton of Precast
Global Warming Potential (Co ₂ eq.)	1,730 short ton	438 lbs/short ton
Total Primary Energy Consumption	13,593 MMBtu	1,719 MBtu/short ton
Water Use	2,114 kgal	267 gallon/short ton

Figure 3: Example of plant results summary.

the manner it is shipped can be entered one time, and it does not need to be changed unless the source location changes. The total weight of cementitious materials used for a specific time period is entered for each type (Figure 1).

The next tab is for plant inputs, which requires information on other raw material usage and sourcing as well as water use, electricity consumption, fuel usage and waste transportation. Once all the information is entered, a non-verified Environmental Product Declaration will be generated based on those results (Figure 2). EPDs are being requested more and more on many projects. Information on these environmental labels can be found at precast.org/epds.

PLANT TOOL

You also get a plant results summary that clearly shows global warming potential, total primary energy consumption and water use (Figure 3). These are also displayed graphically (Figure 4).

Imagine making improvements

at the plant and watching these numbers drop over months and years. That's a powerful marketing tool that goes beyond just making claims.

You can also use a project calculator to measure results based on a specific project. This could be very valuable information for developers or agencies seeking specific sustainability-related targets.

The software is very easy to use with clear and concise instructions along the way and easy-to-follow prompts. Most of the work comes with filling out the software the first time. Subsequent reports will be easier to complete as long as most sourcing locations are the same. NPCA also has a webinar available online for any member considering trying out this software. Developer Jamie Meil goes through the tool step-by-step in a one-hour webinar.

REPORTING AS AN ASSOCIATION AND AS AN INDUSTRY

The data from each participating plant will also be anonymously collected by NPCA to track and evaluate our performance as an association. In addition, along with data from CPCI and PCI, it will be used to track, evaluate and report our performance as an industry. Eventually, we hope to collect enough data to enable NPCA to report periodically on progress by our members and give our customers yet another reason to make precast their material of choice.

NPCA IS HERE FOR YOU

NPCA has been working hard over the years developing materials and acquiring tools to help members embark on or enhance their sustainability efforts. This sustainability plant program is designed to give members a snapshot of where they are and encourages continuous improvement. Please consider taking advantage of this valuable resource. NPCA professional staff members are available to help you through it every step of the way.

For questions on the sustainability plant software, or any other sustainability-related topic, please contact Claude Goguen, P.E., LEED AP, director of technical education and outreach, at cgoguen@precast.org or at (317) 582-2328. **PI**

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

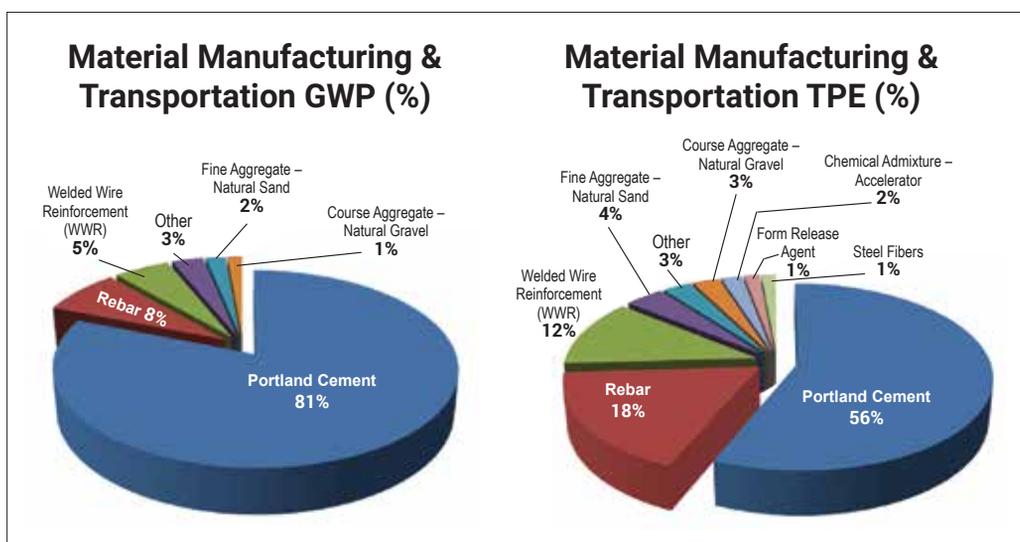


Figure 4: Examples of graphical results. Top, global warming potential by % for each material. Bottom, total primary energy use by material.



Working For You IN REVIEW

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.

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.



Rich Krolewski

Certification and Specifications

Rich Krolewski, director of certification and regulatory services, continues to promote precast and NPCA Plant Certification to federal agencies, state departments of transportation, cities and counties. Plant certification

was added to requirements in Wyoming, District of Columbia, Washington State, Texas and the US Forest Service.

Krolewski also successfully promoted precast specification requirements to city agencies. New additions of precast-related specifications were incorporated in city documents for Cheyenne, Wyo., Indianapolis, Washington, D.C., Minneapolis, Kansas City and Honolulu, Hawaii. These efforts to promote precast specifications and NPCA Plant Certification result in more jobs and project bids for NPCA members.

Marketing*

Targeted advertisements have driven more than 70,000 visitors to precast.org in the first half of 2018 and influenced a 1,755% increase in NPCA's marketing video views going into the second quarter. NPCA's Facebook and Twitter accounts have added more than 4,000 new followers this year and have more than 130,000 new engagements such as likes, shares, comments and retweets.

* Projected metrics through June 30, 2018

Codes and Standards

NPCA professional staff members have attended or been on conference calls for 12 meetings as they actively represent the precast concrete industry on 39 codes and standards groups, committees and task forces. NPCA professional staff attended nine codes and standards meetings and took on one additional industry committee role.

Eric Carleton, P.E., director of codes and standards, had a productive first half of 2018. He attended five of the six meetings, including the Transportation Research Board, Army Corps of Engineers, 2018 ACI Spring Convention, National Transportation Product Evaluation Program and AASHTO Subcommittee on Bridges and Structures. Additionally, he secured a membership role with the Canadian Standards Association and was appointed to serve on the CSA A257 Technical Committee on Concrete Pipe.

Specifier and Student Outreach

NPCA professional staff members have made in-person presentations to 1,236 specifiers and 214 students, with several additional presentations planned through the remainder of 2018. On August 30, NPCA's 2018 Specifier Webinar Series kicks off with a webinar on microbiologically induced corrosion (MIC). Three additional specifier webinars will follow on retaining walls, precast concrete pavement systems and gravity grease interceptors.

Other Activity

NPCA professional staff represents on-site water and wastewater precast products

In the first quarter of 2018, NPCA professional staff members presented at eight and exhibited at five on-site water and wastewater events across the U.S. In a combined effort, Claude Goguen, P.E., LEED AP, Kayla Hanson and Eric Carleton, P.E., educated 820 specifiers, regulators, installers and students through this campaign.



Eric Carleton, P.E.

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.



Ashley Smith

ASHLEY SMITH ELECTED AS SMITH-MIDLAND CORP. CEO

Smith-Midland Corp. announced the appointment of Ashley Smith as chief executive officer. He replaces his father, Rodney Smith, who will remain as chairman of the board.

Ashley Smith began his full-time career with the company 33 years ago in sales and marketing. He ran the licensing division, Easi-Set Worldwide, from 1988-1991. Transferring back to Smith-Midland as vice president of sales, he rose to become president and COO in 2008. He has been involved with management and oversight of all company divisions throughout his tenure at Smith-

Midland Corp. and has been a board director since 1994. He currently serves as NPCA's Chairman of the Board.

HAWKEYEPEDERSHAAB COMBINES WITH CAM SALES

HawkeyePedershaab Concrete Technologies has announced its acquisition of CAM Sales.

CAM Sales manufactures prefabricated shear steel stirrup assemblies and reinforcement accessories and provides precast concrete production equipment in North America. With this acquisition, HawkeyePedershaab expands its product offerings for the concrete industry.

Headquartered in Ludington, Mich., CAM Sales is led by President James Wright, who will continue with the business.

SPILLMAN COMPANY TURNS 70

Longtime NPCA member Spillman Company is celebrating its 70th anniversary this year.

Founded in 1948 by Robert L. Spillman, the company first specialized in dry-cast concrete machine products. In 1957, William and Barbara Coons purchased the company and expanded its products to include burial vaults, steps, septic tanks and dry wells to accommodate the precast concrete market.



The Coons family, circa 1959



Spillman 1962



Spillman 2018

As the company continued

to grow, the demand for space resulted in constructing a 14,000-square-foot factory and office in 1961. This allowed Spillman Company to enter the market for precast architectural specialty forms. Eldest son Ted Coons joined the company full time in 1972 after William passed away in 1971. He became president in 1977 and was elected chairman of the board and CEO in 2003.

Today, the company continues to develop new markets and products. Building on more than 15 years of experience in architectural precast, it recently began producing self-stressing and free-standing structural forming products.

ALLIED CONCRETE PRODUCTS CELEBRATES 70 YEARS

Longtime NPCA member and family-owned company Allied Concrete Products celebrated its 70th Anniversary on May 19, 2018. Approximately 300 customers, vendors, family and friends came to the celebration to congratulate the company.



Allied Concrete's 70th Celebration

Owner Pete Furey's maternal grandparents, Barney and Rosemarie Maguire, started the business in the basement of their home in 1948. Today, the fourth-generation company is thriving as Pete runs it with his wife Amparo, brother-in-law Doug Thurman and son Kyle Furey.

Barney and Rosemarie have since passed, but Pete said they would have been proud and pleased to witness all the people who visited to pay their respect.

"It really is something to be proud of," he said.

PROALL APPOINTS NEW CEO

ProAll announced the appointment of Michael Powell as chief executive officer. He will assume responsibilities immediately, succeeding Larry Koop, who has stepped down as CEO, but will remain on the ProAll



John W. Dominice

Board of Directors and be available in a consulting role.

Koop has been part of the ProAll team for five years, joining as CEO in 2013. During his time, he oversaw the company's

construction of a new manufacturing facility, expansion into several new markets and development of the Commander control system.

MAX USA CORP. ANNOUNCES PROMOTION

MAX USA Corp. announced that it has promoted John W. Dominice III to senior vice president of sales. Dominice has



AL-1 System Crane Rail

worked for MAX USA Corp. for 19 years. Since joining the company, his efforts have increased the brand's market penetration, boosted the company's sales volume and created greater brand awareness for its industrial products.

NEW EMH AL-1 SYSTEM CRANE RAIL PROFILE ACCOMMODATES LIGHTER LOADS

EMH has introduced its new AL-1 System crane rail profile that accommodates AL System Workstation Cranes handling lighter loads up to 250 lbs. The new, smaller AL-1 lightweight aluminum track profile incorporates a t-slot design for splicing two pieces of rail together and anodized enclosed rails for maintenance-free workstation solutions.

ALL TOWER CRANE NAMES NEW GENERAL MANAGER, ADDS 11 CRANES

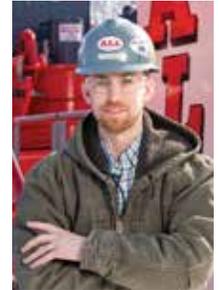
The ALL Family of Companies has promoted Sam Moyer to general manager of ALL Tower Crane. Moyer takes the

reins from Clay Thoreson, who has retired after a long career in the crane business that spanned parts of five decades.

Moyer is looking forward to opportunities including

expanding the division's role as an engineering hub and developing streamlined processes to address service needs.

Continuing to modernize the fleet also remains an ongoing commitment, as illustrated by the Tower division's recent acquisition of 11 new Manitowoc/Potain cranes.



Sam Moyer

COMMAND ALKON NAMED TO BIRMINGHAM BEST PLACES TO WORK 2018

According to the Birmingham Business Journal, Command Alkon has been named a best place to work in 2018. Command Alkon ranked in the top 10 in its category. The 13th annual Birmingham's Best Places to Work awards recognize employers in the Birmingham area that have gone above and beyond to create outstanding workplace environments.

PENTAIR ANNOUNCES NEW ELECTRICAL COMPANY NVENT

Pentair unveiled the name of its future electrical company as nVent Electric and announced additional key leadership. The company's separation into two independent, publicly traded companies remains on track to be completed in 2018.

The nVent leadership team includes Beth A. Wozniak as chief executive officer and Stacy McMahan as chief financial officer. In addition, Randall J. Hogan will serve as chairman of nVent and retire as Pentair's chairman and CEO upon the separation. nVent will employ approximately 9,000 people globally, with its main U.S. offices in Minneapolis. **PI**

CALENDAR OF Events



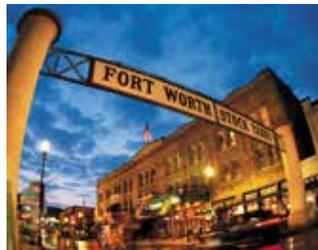
Oct. 4-6, 2018
NPCA 53RD ANNUAL CONVENTION
 Omni Providence Hotel
 Providence, R.I.



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



Oct. 3-5, 2019
NPCA 54TH ANNUAL CONVENTION
 Hyatt Regency Seattle
 Seattle, Wash.



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



For the most up-to-date information about NPCA events, visit precast.org/meetings

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*– Aaron Ausen,
Vice President, Dalmaray Concrete Products*

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