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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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The time is NOW
to start your succession planning!

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On the Cover:

Zen Saladaeng, a precast concrete mixed-use development designed by Synthesis Design + Architecture for the Zen Group in the Bangkok district of Saladaeng, Taiwan, infuses both natural and industrial building elements.

Rendering courtesy of Synthesis Design + Architecture

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Questions from the Field

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

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

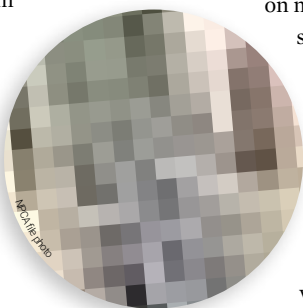
Journault writes:

What about the vibration absorption of railroad ties? Is that significant? I presume wood would be superior in this regard. Also, does that affect noise?

NPCA Technical Services engineers answered:

Typically, after the ties are positioned, a rubber pad is placed on the tie where the rail will sit. This pad absorbs impact and provides electrical insulation between the rail and the concrete. Sound mitigation should be roughly the same for both rail tie materials.

Precast concrete ties have many advantages. Precast ties provide superior load capacity and stability. A track using precast concrete has greater vertical and lateral stiffness. In concert with the consistent, non-shifting gauge, this drastically reduces maintenance for loose rails and fasteners, and track-related derailments are less likely. Unlike wood and steel, concrete ties do not deteriorate or corrode from exposure to weather. Since they are not coated with creosote like wood ties and do not have sharp edges like steel ties, they are safer for employees and better for the environment. They are also noncombustible and reduce the chance of track fires.



CHK writes:

Can anyone elaborate on segregation, especially while using self-consolidating concrete?

NPCA Technical Services engineers answered:

Segregation is defined as concrete constituent materials separating prior to

concrete set. This is not a phenomenon limited to SCC. It can happen with any type of concrete. For example, if you vibrate conventional concrete too long, you risk having the heavier aggregates sink and the water rise. This causes the aggregates to segregate toward the bottom of the structure.

Since we place SCC differently and let it flow under its own energy, there's an increased risk of segregation, especially of aggregates if they are not kept in suspension during flow. As such, segregation is one of the most frequently reported issues with fresh SCC. Resistance to segregation is a factor that contributes to stability. Stability includes dynamic stability and static stability. When the concrete is flowing, we are talking about dynamic stability. Once it reaches its final placement, then we are dealing with static stability. Resistance to segregation depends on many factors, including aggregate size and gradation and viscosity of the mix. Viscosity modifiers are sometimes used to reduce segregation.

For example, if you notice immediate segregation, this usually points to a viscosity issue and can indicate excess water. Excess aggregate moisture can be the culprit as it can significantly raise the water-cement ratio. A delayed segregation, or segregation that occurs once the SCC reaches its final position, can be caused by adding too much high-range water reducer.

If you're having issues with segregation, a good place to start is to look at your moisture contents. Are you adequately checking your aggregate moistures? If you're doing that with probes, have those probes been

calibrated? It's also a good idea to consult with your admixture supplier.



Jun writes:

Our design mix is supposed to be for 80-millimeter slump. The water-cement content ratio is 0.35. The slump we got was 40 millimeters.

How are we going to adjust the slump to 80 millimeters without altering the water-cement ratio? Is batch adjustment used for wet aggregates, dry or both?

NPCA Technical Services engineers answered:

If the aggregates are dry, they will absorb the mix water and reduce your slump and w/c ratio. Prior to batching, you should check your aggregate's moisture content and compare it to how the mix design was proportioned. If your mix design assumes you'll be using aggregates in a saturated surface dry state, but the aggregates you use are dryer than SSD, the aggregates will absorb mix water. Dry aggregates can also absorb any liquid admixtures in the mix, which can greatly reduce effectiveness. Similarly, if your aggregates are wet, they will add water to your mix. This results in greater slump and in a greater w/c ratio.

One effective way to get a higher slump while maintaining the w/c ratio is by using water reducers. You would use it as a plasticizer since you're looking to increase workability while maintaining current water content. Talk to your admixture supplier about getting to 80 millimeters and staying at 0.35.

ACI 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete," provides further information. **PI**



When concrete adheres to reinforcement, it creates a strong bond that resists compressive and tensile forces.

BOND, Reinforcement Bond

Many factors play a part to **ensure the bond strength** between reinforcement and concrete is strong.

By Eric Carleton, P.E.

When you hear the word bond, you may think of 007 agent James Bond, who was made famous by Ian Fleming's novels and corresponding hit movies. However, those who work in the concrete industry likely think of the interaction between concrete and reinforcement. Like the secret agent who never dies, concrete reinforcing bond ensures your precast products are long-lasting.

UNDERSTANDING BOND

Concrete has excellent compressive strength, but lacks in tensile strength. Adding reinforcement creates a composite structure that can handle compressive and tensile stresses. But simply including the necessary reinforcement in the proper position doesn't guarantee structural adequacy. The reinforcement must also adhere to the concrete in order to handle and resist compressive and tensile forces.

Steel bars and wire are traditional types of reinforcement that have excellent high tensile yield properties, ductility and moduli of elasticity that complement concrete's attributes. To provide added durability when required, black steel bars are galvanized or epoxy-coated. Specialty stainless and new corrosion-resistant steels are also readily available. In addition, non-metallic reinforcing bar alternatives made from glass fiber reinforced polymers are available. With all these options, one key design property that must be understood is bond strength, a concept that has been thoroughly investigated and quantified through the efforts of academic research, the American Concrete Institute and ASTM International.¹

FACTORS AFFECTING BOND

Reinforcing bond is developed by adhesion, friction and mechanical means.² Adhesion offers the least amount of bond and is primarily created by the chemical interaction between the concrete paste and the reinforcement. Friction bond is the resistance created by the reinforcement and the concrete surface pressing against it. This is the predominant bonding mechanism for smooth bar reinforcement. Mechanical bond occurs when projections or deformations within the bar create a physical interlocking of the bar and concrete.

To properly place reinforcement, equations are used to calculate the minimum length of embedment for prohibiting slippage. This is called development length. Some of the critical variables are identical to those that affect bond strength, including bar size, concrete compressive and tensile strength, concrete cover, type of aggregate, bar spacing and coating (if used).

In addition, like development length, bond strength has a direct connection to the required length for reinforcement splices. Reinforcing splice design requirements, or lap lengths, have been developed through extensive bond research and testing.

To ensure the bond design assumptions are present and the corresponding development and splice lengths are adequate, precasters need to employ quality production practices for optimum reinforcing bond.

CONCRETE PROPERTIES

Producing consistently high-quality concrete is important for compressive strength and durability and has a direct bearing on the reinforcement bond.

Research has shown concrete mixes that include hard aggregates like granites or basalts have better bond strengths than mixes with softer stone, such as limestone. Many lightweight aggregate concrete mixes have shown reduced bond strengths when compared with normal weight concrete.

In addition, concrete with a high water-cement ratio has a reduced bond capacity. High-slump mixes resulting from high water content can cause the concrete paste to settle away from the reinforcing steel and the void to fill with bleed water. This reduces all three bonding mechanisms. However, this has not proven to be a problem for higher-

slump concrete produced by water-reducing admixtures. Still, precasters must be aware that if the self-consolidating concrete mix retards the expected strength gain, this would affect the rate of bond strength development.

When using concrete mixes other than SCC, proper consolidation practices are important to ensure optimum bond. Internal or external vibration will remove trapped air and associated voids. Good consolidation practices will also densify the mix around the reinforcement to improve both friction and mechanical bonding.

REINFORCEMENT'S ROLE

Proper reinforcement placement is critical for many reasons, including concrete bond. For example, if bar placement is less than the design cover, microcracks can lead to macrocracks and the resulting loss of bond. Steel corrosion and spalling may also occur.

During dry-cast production, correct reinforcement cage fabrication is important for optimum bond. If spacer clips are used to provide proper cover but the cage is not sized correctly and is forced into the formwork, it will be put into stress. Unlike wet-cast production, where concrete cures and hardens prior to form removal, the immediate form removal of the plastic dry-cast mix allows the stressed cage to spring back to its original position. This can result in a "slab off" of sections of concrete or create an excessive void around the steel, which greatly diminishes any anticipated friction bond.

STEEL REINFORCEMENT

A few decades ago, any rust on steel reinforcement was considered deleterious and was removed. However, it's now known that minor surface rust has no detrimental effect on the bond characteristics of reinforcing steel. In some cases, minor surface rust has improved friction bonding

Precasters must be careful when substituting bare carbon steel with epoxy-coated rebar since it may not be appropriate in some cases.



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characteristics. However, basic limits still apply. For example, rebar that shows scaling or pitting should not be used. Though steel reinforcement can be stored outdoors, best management practice dictates that steel should be placed on dunnage with no ground contact and stored in areas with no standing water.

CORROSION-RESISTANT REINFORCEMENT

In some instances, precast plants use corrosion-resistant steel reinforcement for concrete structures placed in harsh or extreme environments. Most corrosion-resistant alternatives are metallic-based or carbon steel with a protective epoxy coating, but glass fiber reinforced polymer bars are growing in demand. Before any corrosion-resistant reinforcement is included, however, the design characteristics must be carefully researched.

Epoxy-coated rebar is regularly used in precast structures; however, epoxy coating of deformed bar reduces friction and thus the bond strength with the concrete. Additionally, thicker coatings show less bond than thinner coatings, which could be attributed to the coating filling the bar deformation geometry and reducing the mechanical interlocking. Currently, design codes apply additional multiplication factors when calculating the development length when epoxy-coated reinforcement is used. Precasters must be aware of these differences and that a straight substitution of bare carbon steel with epoxy-coated rebar may not be appropriate in some cases without some development length adjustments.

Types of corrosion-resistant metallic rebar include stainless steel, low-carbon, high-strength chromium steel products, zinc-coated galvanized bar and dual-coated rebar. All these products are undergoing or have undergone testing regarding bond strength per ASTM A944. Results vary, but in general the bond strength of corrosion-resistant materials is within 95% of the accepted values for traditional carbon rebar. When

using CR reinforcement, precasters need to carefully review the production drawings to determine if any unique development length or splice overlaps are required. Also, precasters need to investigate if a stock substitution of CR reinforcement for standard carbon steel rebar can be done.

Fiber reinforced polymer bars have many beneficial attributes – primarily, high tensile strengths, corrosion resistance and the ability to be used in environments sensitive to electric

SIGNIFICANT RESEARCH AND ENGINEERING

goes into the design and production of a strong, durable, safe and resilient precast concrete structure.

currents. However, there are also many other material attributes that need to be addressed prior to general design acceptance. One issue under investigation is appropriate bond strength, which has proven difficult to determine due to the various types of FRP available, and the fact that its surface is softer than steel.³

If you cast a structure using FRP bars, pay close attention to the manufacturer's recommendations and fabrication details. If permitted to substitute one FRP manufacturer's bar with another, ensure they are equal to the original design expectation.

FIBER REINFORCEMENT

Although the actual steel fibers in fiber-reinforced concrete are small, bond strength and development length are still important. To achieve bond strength, there are many proprietary configurations of special hooks or helical shapes, surface roughness or chemical bonding.

According to Yaun and Graybeal (2015), "The discrete steel fiber reinforcement included in UHPC allows the concrete to maintain tensile capacity beyond cracking of the cementitious matrix. The combination of the matrix and fiber performance allow for a reduction on the development length of reinforcing steel bar, thus providing the potential for a redesign of some structural systems such as field-cast connections between prefabricated bridge elements.

"It was found that the bond behavior of deformed reinforcing steel in UHPC

is different from that in traditional concrete in many aspects. In general, the reinforcing steel development length in UHPC can be significantly reduced.”⁴

Fibers used in conjunction with UHPC can greatly increase bond strength, which results in reduced development length requirements and reduced reinforcement splicing requirements, leading to more structural precast bridge component connections.

FORM OIL

Like rust, the question of how much detrimental effect form oil has on reinforcing bars is now the subject of research.

The current code provisions within ACI 301, “Specifications for Structural Concrete,” section 2.3.1.15, state, “Do not allow formwork release agent to contact reinforcement.” The NPCA Quality Control Manual for Precast Concrete Plants, section 4.3.2, also states, “Reinforcement and other items to be embedded in concrete shall be free of form release agent.”

However, recent research⁵ casts doubt on this intuitive school of thought and current code language. Until additional data verifies results, form oil should be removed from reinforcing elements, particularly on epoxy-coated and smooth FRP bars.

AGENT 007 REINFORCEMENT

Significant research and engineering goes into the design and production of a strong, durable, safe and resilient precast concrete structure. The next time you are at the movies watching the latest 007 thriller, know there is another “bond” working to keep you safe. **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 Committee C13 on Concrete Pipe.


RESOURCES:

- 1 ASTM A944, “Standard Test Method for Comparing Bond Strength of Steel Reinforcing Bars to Concrete Using Beam-End Specimens,” and ACI 408R-03, “Bond and Development of Straight Reinforcing Bars in Tension,” provide better correlation and comparison of research results internationally. This practice is important for new reinforcing products.
- 2 Zuo and Darwin (1998), “Bond Strength of High Relative Rib Area Reinforcing Bars,” Structural Engineering and Engineering Materials SM Report, No. 46.
- 3 Bond of FRP Reinforcement in Concrete - A Challenge, Article in Mechanics of Composite Materials, 39(4):315-328, July 2003.
- 4 Bond of Reinforcement in Ultra-High-Performance Concrete by Jiqui Yuan and Benjamin Graybeal. ACI Structural Journal, V. 112, No. 6, November-December 2015.
- 5 Belarbi, A., Richardson, N.D., Swenty, M.K. and Taber, L.H., (2010), Effect of Combination on Reinforcing Bar-Concrete Bond, Journal of Performance of Constructed Facilities, ASCE, Vol. 24, No. 3, May-June.

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SCMs in Concrete:

Silica Fume

By Kayla Hanson

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



Northeast Prestressed Products manufactured prestressed concrete beams for the Interstate 276 turnpike overpass in Bucks County, Pa. A blended self-consolidating concrete mix design with microsilica and slag made it possible to achieve a 9,000 psi required 28-day strength.

The third supplementary cementitious material on the list of the most commonly used manufactured SCMs is silica fume, also referred to as microsilica or condensed silica fume. According to Eckart Bühler, engineering services manager at Norchem Inc., silica fume is a very fine pozzolan that has been widely used in high-performance concrete applications for more than 30 years. It is ideally suited for precast concrete operations due to the high level of quality control involved in every

step from material procurement to shipping and high-efficiency mixers.

“Advanced proportioning experience with silica fume can provide engineering sophistications from viscosity modification in highly flowable concrete mixtures to acceleration of production cycles with attaining one-day compressive strengths up to 10,000 psi,” Bühler said.

Typically, silica fume concrete is specified by the engineering community for added durability and overall lower life cycle costs in concrete structures.

SILICA FUME BASICS

Silica fume is a byproduct from the production of silicon alloys in an electric arc furnace. The materials are heated to more than 3,600 degrees Fahrenheit in a process that separates silica from the oxygenated silica fume. The process removes the oxygen from the silicon, separating the silica from the oxygenated silica fume. As it leaves the furnace, silica fume cools and condenses and is collected via filtration systems. Facilities collect the emanating silica vapor and process it for use in concrete.

On average, silica fume particles are about 1/100 the size of portland cement grains, measuring around 0.1 micrometers in diameter. The extremely small, spherical particles give silica fume a very high fineness and a larger surface area per volume, especially when compared with portland cement.

Small, uniform cementitious particle sizes are beneficial in concrete applications where optimized particle packing and density is crucial. Silica fume's extremely fine particle size makes working with the material as produced impractical. It is primarily used in its densified form at a replacement rate of about 5% to 10% by total mass of cementitious material.

Like fly ash and slag cement, silica fume's chemical makeup is dependent on the nature of the materials combined in the furnace. Silica fume created during silicon alloy production has a higher silica content, while silica fume produced as a result of manufacturing ferrosilicon alloys has a significantly lower silica content. Silica fume's behavior in concrete is predictable, but still dictated by the material's composition.

PRODUCTION USING SILICA FUME

Silica fume reacts with calcium hydroxide produced by cement hydration reactions and produces more calcium silicate hydrate, which continues to add strength to the concrete matrix. When smaller quantities of silica fume are used as a replacement for portland cement, water demand may not increase. However, when replacement rates exceed approximately 5%, water demand will increase and workability can decrease. As a result, some mixes tend to develop a sticky consistency that could make finishing more difficult.

Silica fume also has a drastic effect on bleeding. Special care needs to be taken during placing, finishing and curing because mixes made with typical proportions of silica fume and a low water-cementitious material ratio may not bleed. As such, concrete made with silica fume has a higher tendency to develop plastic shrinkage cracks unless appropriate measures are taken to avoid mix water evaporation.

Like fly ash, silica fume will typically decrease air content because of an increased amount of finer cementitious material in the mix.

SETTING TIME AND STRENGTH DEVELOPMENT

When used at normal replacement rates, silica fume has little effect on setting time and little impact on heat of hydration. However, silica fume's particle size and rapid pozzolanic reaction rate can help increase early strength gain. As with most pozzolans, concrete made with silica fume can continue to develop strength over time at a rate greater than ordinary portland cement concrete. The duration and extent of increased strength development is more drastic with silica fume than fly ash or slag cement.

SCMs INCREASE DURABILITY

Concrete made with silica fume can dramatically increase corrosion resistance, decrease alkali-silica reactivity and increase resistance to sulfates. This increased durability and resilience can be attributed to decreased permeability and absorption. Silica fume is often used in high-strength concrete or high-performance concrete. In many mixes, compressive strengths in excess of 20,000 psi are possible.

A low water content and in turn, a low w/cm ratio, reduces porosity, or the ratio of the total volume of void space to the total volume of concrete. Lower porosity can lead to lower permeability, which makes it more difficult for any detrimental materials to enter and travel through concrete. All these factors help create a denser, less porous and less permeable product, which directly relates to increased durability.

Fly ash, slag cement and silica fume have little to no impact on concrete's drying shrinkage and creep. Concrete's behavior in these conditions is mostly affected by the relation between cementitious paste and water content. These SCMs also have no notable impact on freeze-thaw resistance.

Silica fume is often used as a mix design tool to increase concrete's abrasion and impact resistance by strengthening the cementitious fraction of concrete to the level of the aggregate's hardness. In this scenario, it is of benefit to decrease the total binder content and maximize aggregate content. Silica fume is more strength producing than portland cement, fly ash or slag cement. Therefore, the total



binder content can be significantly reduced, achieving the highest possible psi per pound of binder. Higher compressive strength at minimized total binder volume assures maximized abrasion and impact resistance of concrete with any given aggregate.

The prestressed concrete beams installed on state Route 422 over the Norfolk Southern Railroad mainline in Montgomery County, Pa., were manufactured with a microsilica blended mix design. Concrete with silica fume has increased durability and strength development.

SUSTAINABLE BENEFITS AND DECREASED LIFE CYCLE COSTS

When designers choose materials for a project, they often look to use materials with lower environmental impacts and with recycled content. The use of SCMs in manufacturing concrete can help fulfill those goals.

Use of blended cement or the partial replacement of portland cement with industrial byproducts such as fly ash, slag cement, silica fume and other SCMs reduces the amount of clinker required per cubic yard of concrete. Because the clinker and cement manufacturing process requires so much energy, using less clinker reduces the resultant CO₂ emissions and in turn, reduces the carbon footprint. For example, silica fume is designated by the U.S. Environmental Protection Agency as a recovered mineral component. This means it plays an important role in the sustainability of a structure by reducing the carbon footprint of concrete, according to Bühler.

When industrial byproducts are used, they not only provide a sustainable option through reuse, but also improve concrete properties while reducing cost.

Using blended cements or any appropriate partial replacement for OPC can result in cost savings. When a new component in a mix design provides a longer service life at a lower up-front cost and offers less maintenance and less cost throughout the product's life, it may sound too good to be true. However, when used in appropriate applications, SCMs can make this scenario a reality.

REMEMBER TO USE SCMs WITH CARE

Despite offering beneficial physical characteristics or contributing to concrete strength, SCMs must be used with care.

For instance, the benefits of one SCM may be offset or eliminated when incorporating an admixture or adding a third cementitious material. In another scenario, the fresh concrete may not behave as expected due to a fluctuation in the SCM's source material or its manufacturing process. But a three-part blend of portland cement and two SCMs may bring out the best qualities in each component.

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

Kayla Hanson is a technical services engineer with NPCA.

Silica Fume

Specifications & Classification

- **ASTM C1240, "Standard Specification for Silica Fume Used in Cementitious Mixtures,"** specifies requirements for silica fume used in concrete and outlines the three forms in which silica fume is used in cementitious applications: as-produced, as a slurry mixed with water or as a densified product.
- **ACI 234, "Guide for the Use of Silica Fume in Concrete,"** addresses in detail silica fume's properties, behavior and effects on fresh and hardened concrete as well as other considerations.



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Troubleshooting

CONCRETE PROBLEMS

By G. Terry Harris Sr.

Using a detailed process to **analyze an issue in the plant, report the error and quickly determine corrective action.**

No matter how much concrete you batch in your precast plant, at some point you will have problems with its performance – whether it’s due to low strength, slump loss, inconsistent entrained air or another issue. While quick action is critical when these problems occur, it is also important to have a process to follow for solving these problems and avoiding a reoccurrence.

TROUBLESHOOTING OR PROBLEM SOLVING

Before taking any action, be clear about what you want to accomplish. Troubleshooting can occur on the plant floor or during production and is often referred to as “putting out the fire.” Some problems must be solved immediately to continue production. For example, with a batch of concrete that has excessive slump, you likely won’t take the time to determine the exact cause of the high slump, but will reduce the water or admixture content

so the next batch is within the specified limits. Thus, you've solved the immediate problem and production can continue. Using this same example, a detailed process can be followed to determine why that particular batch was wet and what steps can be taken to prevent future slump problems.

PROBLEM SOLVING STEPS

There are a number of tools available to help with the problem-solving process. Part of Six Sigma is the DMAIC cycle: define, measure, analyze, improve and control.

- ▶ **Define the problem** – Concrete problems are seldom simple or one-dimensional. Is the slump inconsistent because the air is fluctuating, or is the air fluctuating because the slump is inconsistent? An accurate problem statement is key.
- ▶ **Measure performance** – Anecdotal data is often useful in problem solving, but hard data is required to determine current performance and improvement over time. For example, slump measurements are required to accurately gauge performance. It may be necessary to increase the frequency of testing temporarily to collect more data.
- ▶ **Analyze the data** – Once collected, analyze the data to assess if the root cause can be determined or if more information is needed.
- ▶ **Improve the process** – Once you have determined the root cause, you can then make changes in procedures or materials to eliminate or reduce the frequency of the problem.
- ▶ **Control** – Develop new control procedures to ensure the improved process is followed.

FINDING THE ROOT CAUSE

After you have a defined problem statement – which is often more difficult than it sounds – and have collected sufficient data, you can determine the root cause of the problem. One of the first steps to take in any problem-solving investigation is to talk with the people involved in the process. Continuing with the example of excessive slump, at a minimum you need to interview the batch technician, loader operator, delivery vehicle operator and quality control technician.

While you review and analyze the data, the additional information collected from those involved in the process is often invaluable. There are times when you can easily identify the root cause of an issue through the interview process. For example, in looking at the data and interviewing the key production staff, you may learn that the first batch after the lunch break always has a high slump. You can then determine the difference of the after-lunch batch and take steps to correct the issue. In addition, here are two tools that are easy to use in a root cause investigation:

5 Whys

This is a very simple tool, but the answers may be difficult to determine. The purpose of the 5 whys is to dig deeper into each answer that is given during your investigation. Continuing with our slump example, here is an interview scenario using the 5 whys.

Q: Why was the batch rejected?

A: Slump was too high.

Q: Why was the slump too high?

A: There was too much water in the mix.

Q: Why was there too much water in the mix?

A: The aggregate moistures were incorrect.

Q: Why were the moistures incorrect?

A: The moisture probes were turned off.

Q: Why were the moisture probes turned off?

A: They needed to be calibrated.

In this example, the rejected high-slump batch resulted from aggregate moisture probes that were turned off because they needed to be calibrated.

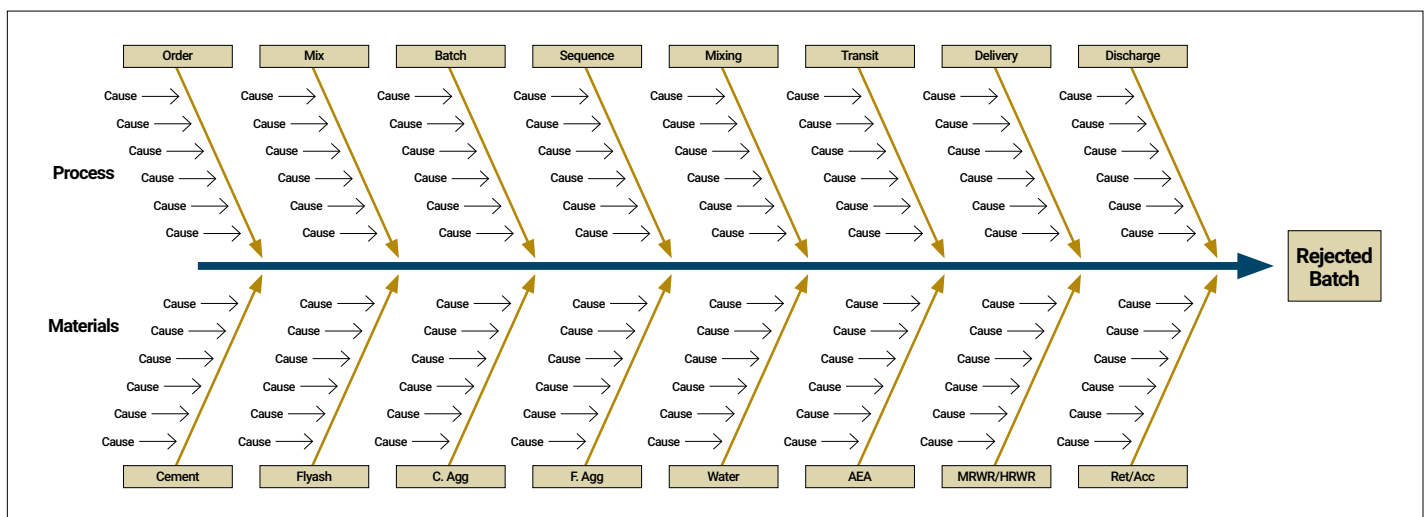
Fishbone Diagram

The fishbone diagram is another tool that can be used to determine the root cause of a problem. The problem is the head of the fish. In this case, it's rejected batches. The major components of the mix are on the bottom and on the top are production processes. Each of the "fish bones" can be filled in with possible rejected batch causes for each step or material.

HAVE A PROCESS

Regardless of the problems you encounter while producing concrete, having a process that you follow to solve each problem is important. Using the tools like 5 whys and the fishbone diagram can make solving problems easier, but you can also develop your own tools and processes. The key is having a formalized process that you can follow when problems occur to make solving problems easier and to improve and create controls to reduce them. **PI**

G. Terry Harris is director of technical services at GCP Applied Technologies, Cambridge, Mass. He has 37 years of experience in the concrete industry, including ready mix, precast, prestress, masonry and admixtures, and is an active participant in ACI, ASTM, NRMCA and NPCA.



Example of a Fishbone Diagram



Good Housekeeping FOSTERS SAFETY

By Evan Gurley

Maintaining order throughout the day requires a great deal of planning and management.

Housekeeping is not just about cleanliness. It includes keeping work areas neat and orderly and keeping aisles, floors and stairs free from slip and trip hazards. In addition, good housekeeping promotes a safer, more efficient work environment. And maintaining order throughout the day requires a great deal of planning and management. To help precasters and other manufacturers maintain good housekeeping practices in the plant, the Occupational Safety and Health Administration has revised and updated its general industry standards on walking-working surfaces.

According to OSHA, falls from heights are the No. 1 leading cause of serious work-related injuries and deaths. On average, more than 200,000 serious injuries and 345 fatalities occur annually among workers directly affected by the final standard.

WHAT IS INCLUDED IN THE FINAL RULE?

The final rule covers all general industry walking-working surfaces, including but not limited to, floors, ladders, stairways, runways, scaffolds, elevated work surfaces and walkways. To protect workers from hazards associated with those surfaces, the final rule updates and revises general industry standards (29 CFR part 1910, subpart D).

Also included in the rule are revised and new provisions that address fixed ladders, rope descent systems, fall protection systems and helpful criteria on personal fall protection systems and training. In addition, the final rule adds new requirements on the design, performance and use of personal fall protection systems to the general industry personal protective equipment standards (29 CFR part 1910, subpart I).

The final rule increases consistency between general industry and construction standards, which will make compliance easier for employers who conduct operations in both. The rule updates requirements to reflect advances in technology, creating consistency with recent OSHA and national consensus standards. The final rule also uses performance-based language whenever possible to give employers greater compliance flexibility. OSHA estimates the final standard rule will prevent 29 fatalities and 5,842 injuries each year.

EFFECTIVE DATE

The final rule went into effect on Jan. 17, 2017. Most of the requirements in the final rule are existing provisions that OSHA is retaining and updating. OSHA believes that employers are already in compliance with those provisions and, therefore, it is not necessary to provide additional time to comply with them.

The extended compliance dates give employers time to get familiar with the new requirements, evaluate changes they may need to make, purchase equipment necessary to comply with the final rule and develop and present required training. The compliance date for the required training component was May 17, 2017.

WALKING-WORKING SURFACE COMPLIANCE DATES

Final Subpart D Section and Requirement	Compliance Date
§1910.27(b)(1) – Certification of anchorages.	Nov. 20, 2017
§1910.28(b)(9)(i)(A) – Deadline by which employers must equip existing fixed ladders with a cage, well, ladder safety system or personal fall arrest system.	Nov. 19, 2018
§1910.28(b)(9)(i)(B) – Deadline by which employers must begin equipping new fixed ladders with a ladder safety system or personal fall arrest system.	Nov. 19, 2018
§1910.28(b)(9)(i)(D) – Deadline by which all fixed ladders must be equipped with a ladder safety system or personal fall arrest system.	Nov. 18, 2036
§1910.30(a) and (b) – Deadline by which employers must train employees on fall and equipment hazards.	May 17, 2017

In addition to the compliance dates, OSHA also has developed training requirements to ensure workers who use personal fall protection are trained and retrained as necessary about fall and equipment hazards, including fall protection systems.

A qualified person must train workers to correctly:

- ▶ Identify and minimize fall hazards
- ▶ Use personal fall protection systems and rope descent systems
- ▶ Maintain, inspect and store equipment or systems used for fall protection


Situations requiring retraining of employees include, but are not limited to:

- ▶ When changes in the workplace render previous training obsolete or inadequate
- ▶ When changes in the types of fall protection systems or equipment to be used render previous training obsolete or inadequate
- ▶ When an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee no longer has the understanding or skill necessary to use equipment to perform the job safely

HAMILTON FORM CREATES FUNCTION

7 CASE STUDY

Self-Stressing Architectural Table



"The casting tables went together quickly and easily. The hydraulically operated side rails are attached on both sides of the casting tables and drop down to allow edge picking of the panels. This smooth, more efficient process facilitates stripping while greatly reducing daily set-up and casting cycles."

*Gregg Jacobson, General Manager
Wells Concrete Products Company*

Wells Concrete installed several self-stressing architectural casting tables in its plants from Hamilton Form Company. A self-stressing frame transfers the prestress load. A wood deck is installed over the frame finished with an epoxy coating that creates a glass like surface for casting precast/prestressed architectural panels.

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“We implemented a program that QC inspectors will not sign off on a pre-pour or post-pour ticket unless the catwalk is free of debris such as terminators, hammers, etc. **The program is working great.**”

– Ruben Gallegos, Jensen Precast

The following ladder requirements are part of the new rule:

- ▶ Each ladder must be inspected before initial use in a work shift to identify defects.
- ▶ Ladders must be capable of supporting the maximum intended load.
- ▶ Mobile ladder stands and platforms must be capable of supporting four times the maximum intended load.
- ▶ Fixed ladders (ladders permanently attached to a structure, building, or equipment, excluding manhole steps) that extend more than 24 feet require that employers have ladder safety or personal fall arrest systems. This rule phases out the use of cages or wells for fall protection. Within 20 years, all ladders extending more than 24 feet must have ladder safety or personal fall arrest systems.
- ▶ Under the revisions for portable ladders, employers must ensure that:
 - Rungs and steps are slip-resistant.
 - Portable ladders used on slippery surfaces are secured and stabilized.
 - Portable ladders are not moved, shifted or extended while a worker is on them.
 - Top steps and caps on stepladders are not used as steps.
 - Ladders are not fastened together to provide added length unless designed for such use.
 - Ladders are not placed on boxes, barrels or other unstable bases to obtain added height.

The walking-working surfaces final rule provides employers greater flexibility in choosing a fall protection system.

KEY CHANGES

The final rule defines “walking-working surfaces” as any surface on or through which an employee walks, works, or gains access to a work area or workplace location. Below are the most notable changes to the OSHA regulation and how these changes will impact the precast concrete industry.

LADDER SAFETY REQUIREMENTS

Falls from ladders account for 20% of all fatal and lost-work-day injuries in general industry. The new rule includes requirements to protect workers from falling off platforms, portable ladders, mobile ladders and fixed ladders.

FALLING OBJECTS

The new rule also includes requirements for protecting employees in general industry from falling objects. When employees are exposed to falling object hazards, the employer must ensure each employee is provided with and wears compliant head protection.

Employers must also implement one or more of the following:

- ▶ Erect toe boards, screens or guardrails to prevent objects from falling
- ▶ Erect canopy structures
- ▶ Barricade areas where objects have fallen and prohibit workers from entering

FALL PROTECTION OPTIONS

Employers must continue to protect workers from fall hazards along unprotected sides or edges that are at least 4 feet above a lower level. The new revisions set requirements for fall protection in specific situations and establish requirements for the performance, inspection, use and maintenance of personal fall protection systems.

Under the rule, OSHA states that employers may choose from the following fall protection options:

- ▶ Guardrail system
- ▶ Safety net system
- ▶ Personal fall arrest system
- ▶ Positioning system
- ▶ Travel restraint system
- ▶ Ladder safety system (cages and wells are not included)

ROPE DESCENT SYSTEM

Although most precasters will never encounter a situation where rope descent systems are used, OSHA has updated the rule to include a 300-foot height limit and requires building owners to affirm in writing that the anchorages used for the RDS have been tested, certified and maintained to support a maximum of 5,000 pounds for each worker attached.

HOW PRECASTERS ARE ADDRESSING THE NEW RULE

Since the new rule requires employers to ensure working surfaces are kept in a clean, orderly condition, some precasters are making changes now to achieve compliance.

Ruben Gallegos, safety manager at Jensen Precast - Fontana, Calif., stated his company is making several changes.

“We implemented a program that QC inspectors will not sign off on a pre-pour or post-pour ticket unless the catwalk is free of debris such as terminators, hammers, etc.,” Gallegos said. “The program is working great.”

Gallegos added that to keep general work areas clean, the 5S Lean Manufacturing program will be implemented throughout the plant.

“The difference is awesome – less slip and trip hazards,” he said. “All areas will be inspected monthly by me.”

REVIEW CURRENT COMPANY POLICIES FOR CHANGES

The updated language in the new rule brings several changes to both the employer and employees in the precast concrete industry. Employers have more flexible options for selecting fall protection and employees will be better protected. Precasters must take a close look at their current operations to see if and how changes will affect them and address any possible non-compliance concerns. **PI**

Evan Gurley is a technical services engineer with NPCA.

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Start **SUCCESSION** PLANNING NOW



By Bridget McCrea

Succession planning is imperative for precasters in today's business environment.

Succession planning isn't an easy subject for precast manufacturers who know they should be thinking about the next generation of ownership. Busy putting out daily fires and managing their companies, many owners either don't have the time or simply don't have anyone coming up behind them who can one day take over the reins.

Family-run firms have a particularly difficult time with succession planning. According to the Family Business Institute's most recent surveys, 88% of current family business owners believe the same family or families will control their business in five years, yet actual succession statistics undermine this belief. For example, just 30% of family businesses survive into the second generation, 12% are still viable into the third generation and only about 3% operate into the fourth generation or beyond.¹

With the huge baby boomer generation heading into retirement at a high rate, the stark realities of poor succession planning are hitting companies hard right now. And it's not just ownership that's at stake. Succession planning also affects employee recruitment, retention and engagement.

According to Software Advice, which develops software that companies use for recruiting, succession planning also plays a critical role in successful talent management and organizational growth. In a recent survey, the firm found that 62% of employees would be "significantly more engaged" at work if their company had a succession plan. And 94% of employers said having a succession plan positively impacts their employees' engagement levels.²

But even with these truths staring them in the face, most companies continue to operate without a succession plan.

"Business owners function at such a rapid pace to remain competitive, it's no wonder that developing their exit plan and replacement doesn't seem like today's priority," said Kirt Walker, president and COO of Nationwide Financial.³ "Yet, there isn't a more critical component of an operational plan than a solid business succession plan for providing seamless continuity in a time of crisis or transition."

HOLDING OUT HOPE

Gainey's Concrete Products is one NPCA member that has invested time and effort into its succession plan. Based in Holden, La., the company is largely dependent on its president, Greg Roache, for leadership, strategy and growth. While having a strong leader in place is critical, that much dependency on one person makes Roache and his wife, Lisa Roache, vice president, a little nervous. To calm those nerves, they've already tried a few different approaches to succession planning, none of which have worked.

"The simple, classic answer is let's hire ourselves a young graduate engineer and teach him the ropes, and then hope that he wants to take over the business someday," Roache said. "We went into it thinking, 'OK, if we find the right person, we're going to offer him the opportunity to be an owner in the business' – knowing that would turn into an opportunity for that person to make the same amount of money (or more) than they would in a different industry."

Together, the Roaches have interviewed a few people for the position, but said most of them were hung up on the amount of work that it would take to get fully up to speed. One candidate seemed interested and participated in a series of phone interviews, but wasn't prepared to work on Saturdays or put in long hours. So, it

9 WAYS

to be Proactive About Succession Planning

Linda Henman, Ph.D., president of Henman Performance Group in Chesterfield, Mo., offers these nine strategies:

- 1. CLARIFY EXPECTATIONS.** What does the current CEO or president expect from each level of the organization?
- 2. REVIEW THE CURRENT SUCCESSION PLAN FOR THE ORGANIZATION.** Determine if this leadership pipeline supports the mission, vision and values of the organization.
- 3. DETERMINE FUTURE TALENT NEEDS.** Examine current versus required performance, existing enhancement initiatives, projected turnover, anticipated retirements and talent-growth projections.
- 4. ESTABLISH COMPETENCIES FOR EACH KEY POSITION.** This ensures that key positions underscore and dramatize important work processes that must be carried out.
- 5. IDENTIFY EXCELLENCE MARKERS AND CRITICAL SUCCESS FACTORS** for each position on the leadership team. What are the skills, experience, knowledge and personality characteristics required for exemplary performance?
- 6. AS A TEAM, AGREE ON STANDARDS FOR HIGH-POTENTIAL CANDIDATES.** The criteria for determining a high-potential may include the ability to advance two job levels in five years, a willingness to relocate or acquire requisite field experience and the potential for at least 10 to 15 years with the organization.
- 7. IDENTIFY STRENGTHS AND WEAKNESSES FOR EACH INDIVIDUAL** you are considering for key positions. Assess "ready now" people, identify a timeline for "ready now" in the future and examine each high-potential candidate.
- 8. IDENTIFY HIGH-POTENTIALS CURRENTLY IN THE ORGANIZATION** and one or two possible successors for each key position in the pipeline. For immediate decisions, compare this list of high-potential candidates with the list of "ready now" candidates or look at the timeline for projected readiness to determine when they will be able to take on new responsibilities.
- 9. HOLD EVERYONE ACCOUNTABLE.** Assign members of the leadership team accountability for development plans for each high-potential candidate.

became clear that recruiting a successor and offering an ownership stake probably wouldn't be a good fit.

"It was pretty discouraging," said Roache, who admits he obsesses over whether he'll ever find the right successor. "What I'm really worried about more than physical issues is if my mind slips one iota this business is really going to suffer. There comes a time when we all slip, and we're in no position for that to happen."

CONTEMPLATING A TRANSITION

At Jefferson Concrete in Watertown, N.Y., Mark W. Thompson shares many of Roache's pain points. With a handful of silent partners and no children who are interested in taking over the reins, Thompson is leading a successful firm in a very capital-intensive industry, but nearing the end of his career.

"The only way for my partners and me to get a hold on succession planning is by selling the company," Thompson said. "We're constantly looking and I'm not sure how many more years I can go here. Every year, I think it could be the last one."

But even a sale may not make Thompson and his partners happy. After all, Jefferson has turned down at least one offer to merge with a larger conglomerate in the past. Exacerbating the challenge is the capital-intensive nature of the precast manufacturing business and the fact that business fluctuations can heavily impact the balance sheet.

"When you start putting numbers on paper, sometimes things don't look quite as rosy as you would like to have them as you contemplate some kind of transition," Thompson said.

Mills Snell, a partner with Pendleton Street Business Advisors in Columbia, S.C., cautions precasters not to rule out a possible sale as a viable succession planning strategy, noting that even capital-intensive companies can be attractive targets for a certain type of acquirer. Snell said one of the biggest issues that a company like Gainey's Concrete or Jefferson Concrete would face during the due diligence and/or sales process is an owner who can't be effectively separated from the company that he or she built.

In reality, a manufacturing company is a thriving entity with a lifespan that could extend long beyond that of its founder if given the opportunity. And while second and third generations of family owners generally give the founders incentives to "keep things going," Snell said other companies close when their owners pass away or retire.

"A lot of business owners think that if they work and save for a number of years that they can just push a button and retire, and that everything else will work itself out," Snell said. "So, they give their notice, say goodbye to the company they worked at for 35 years and then start their retirement."

With the exception of the highly paid executive who started saving when he or she was 18, this approach

doesn't usually work – mainly because 80% of the typical business owner's net worth is tied up in the company.

"That's not something you can just convert into cash within a few days," Snell said.

On a positive note, Snell said the acquisition environment is friendly right now, with interest rates remaining at historic lows and the lending environment being more favorable than it's been in years. Combined, these two elements can boost a company's chances of being purchased. In addition, the cost of borrowing money to purchase a business is affordable right now. This also creates more margin in terms of how much someone would be willing to pay for a business.

Snell said companies that have substantial balance sheets should take these points into consideration, particularly if much of the power and ownership is concentrated in one individual.

SUCCESSION PLANNING SUCCESS

Linda Henman, Ph.D., is in business for one primary reason: Too many business owners wait until they're 64 years old and then say, "Uh-oh, now what?" With no transition or succession plan in place, many owners either close up shop or work beyond retirement age, neither of which is ideal.

"They struggle with succession because they haven't been thinking about it," said Henman, president of Henman Performance Group in Chesterfield, Mo. "Most have been living in some sort of denial and not thinking about the future."

So what's a better approach? Henman said the answer is simple: as soon as you realize the need for a succession plan, start acting on it. This is a good way to ward off the need for "emergency replacement," said Henman, which can become necessary if the current leader becomes sick or is unable to work.

So when is the right time to start succession planning?

"Right now," said Henman. "If you start five or even 10 years before the estimated departure of the CEO or other key leaders, it may be too late. Unforeseen circumstances can interfere with your best-laid plans, and the company will be faced not with the 'quiet crisis of succession,' but with a screaming one." **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 familybusinessinstitute.com/consulting/succession-planning/
- 2 softwareadvice.com/hr/industryview/succession-planning-report-2015/
- 3 finance.yahoo.com/news/nationwide-survey-finds-majority-business-14000687.html



Start
planning
**RIGHT
NOW!**

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– Linda Henman, Ph.D.,
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CREATE BEAUTY.

Exploring the Global Beauty of Precast

by Sara Geer



ARCHITECTS, ENGINEERS AND CONTRACTORS AROUND THE WORLD CALL UPON PRECAST CONCRETE EVERY DAY TO FULFILL NEEDS RANGING FROM BASIC INFRASTRUCTURE TO INSPIRING DESIGN. IN THE BUILDING MATERIALS WORLD, PRECAST IS A JACK OF MANY TRADES THAT IS LIMITED ONLY BY THE APPLICATIONS SPECIFIERS CAN DREAM UP. IN THIS YEAR'S EDITION OF OUR **INTERNATIONAL ROUND-UP**, YOU'LL VISIT IRELAND, PORTUGAL, TAIWAN AND AUSTRALIA TO SEE HOW SPECIFIERS ARE EMPLOYING PRECAST TO BEAT DEADLINES, ACCOMPLISH GOALS AND CREATE BEAUTY.





Ireland

Precast Expands Ireland Getaways

The secret is out about the wonders of Ireland. Air travel to Dublin Airport reached an all-time high in 2016. Passenger numbers increased to nearly 28 million¹, which also helped to deliver a record year for Irish tourism. To keep air traffic running smoothly, construction is currently underway to add a new

runway and extend the airport's apron. However, more surface area means more stormwater runoff, and precast is the medium of choice to provide an effective drainage solution.

Based on a successful record completing similar projects around Ireland and the United Kingdom, contractor Clare Civil Engineering Ltd. contacted concrete supplier Tracey Concrete to manufacture the precast stormwater products. Tracey Concrete manufactured more than 1,000 linear feet of precast spigot and socket pipe to control drainage for the new apron extension.

According to Anton Tracey, commercial manager at Tracey Concrete, precast was the perfect construction material for the project because it offers increased strength and sustainability.

"Concrete is more durable than other pipe materials because it can carry larger loads and gains strength over time," Tracey said.

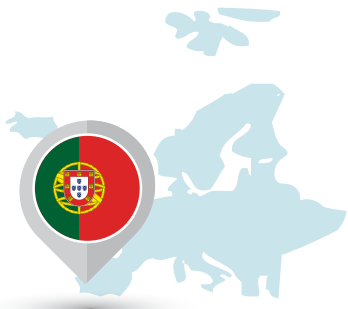
In addition, through research and development, Tracey Concrete produced each pipe with a high-quality, watertight seal that will withstand about 30 psi of water pressure. The pipes were transported eight at a time to the job site by articulated lorries on flat trailers. Comments received from all parties about the pipe production, transportation and installation were positive, Tracey said.

"It was a great project to be a part of," Tracey said.

Now, thanks to precast, Dublin Airport can welcome more adventure and weekend getaways to the island and continue offering the same services for passengers for years to come.

More than 1,000 linear feet of precast spigot and socket pipe was manufactured and installed to control drainage for Dublin Airport's new apron extension.

Photos courtesy of Tracey Concrete



Portugal

Precast Keeps Lisbon Airport Afloat

Water is essential for life. It's in the air we breathe and the food we eat and helps run the daily services we use. It is also important to have adequate water for areas where safety is a concern. The Lisbon Airport in Portugal needed three water tanks constructed quickly for the support backup system for the fuel operating group and cargo complex. The project's short timeline was determined by two factors: the immediate need for the tanks' use and the job site's location inside the airport near the landing runway. Only one construction material was suitable to meet this demand: precast concrete.

Pedro Palma, CEO, managing partner and technical director of structural engineering firm PMP Consulting Engineers, said another challenge was matching the specific tank capacities requested by airport authority ANA Aeroportos de Portugal. The largest of the three tanks – 65 feet in diameter – needed to hold about 450,000 gallons of water. The two smaller tanks would hold about 60,000 gallons. PMP had to consider this in the project plans while also taking into account the tank systems precaster Indubel Indústrias de Betão, S.A., already manufactures.



“The tanks for the airport were similar to other tanks Indubel built before,” Palma said. “However, it was the largest tank in diameter Indubel had built thus far.”

According to Palma, the exterior wall panels were cast using a conventional concrete mix and were prestressed. The different heights of the panels, either 15 feet or 19 feet, depended on the tank’s capacity, but all panels were 12 inches thick. Once the precast panels were transported by truck to the airport, they were assembled on-site using a 100-ton crane.

“The comments about the project have been quite positive since we used a very thin wall structure made of prestressed concrete for the radius and heights of the tanks,” Palma said.

The precast solution allowed for more quality control of the manufactured products, an increased installation speed and lowered the impact of construction, allowing the project to finish on time.



The largest of the three precast concrete water tanks manufactured for the Lisbon Airport in Portugal holds about 450,000 gallons of water.

Photos courtesy of PMP Consulting Engineers



Taiwan

Precast Enhances Creativity

A creative person's best work is greatly impacted by their surroundings. When an artist envisions his or her next masterpiece, being around beautiful things can help boost creativity and motivation. Architect Alvin Huang, design principal and founder of Synthesis Design + Architecture, took this to heart when designing Zen Saladaeng, a mixed-use development for the Zen Group in the Bangkok district of Saladaeng, Taiwan.

Huang said the three existing "magnificent" banyan trees provided the initial inspiration for the building's design and location. Highlighting exposed precast concrete as the primary building material made it possible to also maintain a bold industrial presence. The building will have several stacked, open spaces that consist of folding concrete surfaces that respect and respond to the trees.

"A field of fluid lines that emerge from the site form a collection of surfaces that bifurcate, peel and fold to divide the building into a series of intimate indoor-outdoor spaces," Huang said.

The tree's unique branches and leafy pattern are also abstracted as the inspiration for the custom branching pattern that is stamped onto the precast façade with a sandblasted glazing system.

"A precast concrete curtain wall with a custom reveal pattern is used in the opaque areas of the façade," Huang said. "This allows us to control the finish of the concrete and achieve the desired articulation and detail of the surface through the use of a series of mass customized and digitally fabricated molds."

In addition, precast will allow the façade – including the embedded windows – to be prefabricated safely off-site and delivered to the job site and installed quickly.

The facility, a local retail, dining and entertainment destination, will provide an escape for those who want to be inside and outside at the same time. By fusing natural and industrial elements together, the building is simultaneously "raw and modern, yet warm and inviting," which provides the perfect space to spur more creative thinking.



Banyan trees provided design inspiration for the custom branching pattern stamped on the exposed precast concrete.

Renderings courtesy of Synthesis Design + Architecture

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Australia

Precast as Art

Because no one looks at art the same way, it can have a magical way of bringing out a variety of feelings or actions. Visual arts can be

therapeutic and provide healing attributes, while listening to music can invoke powerful memories. Art also allows an individual or group to communicate a message without words.

The effects of art play heavily into the “retailtainment” concept, which is growing in popularity as the latest weapon for retail

stores against online shopping. It’s a marketing strategy to lure customers back into their stores by using ambiance, emotion, sound and activity to get customers interested in the merchandise and in a mood to buy. To achieve this, one of Queensland, Australia’s largest shopping centers is giving the concept a try by using precast concrete as the medium for a large-scale mural design.

When Westfield Garden City, a shopping center located in the Brisbane suburb of Upper Mount Gravatt, started planning a redevelopment, architect and builder Westfield Design and Construction suggested graphic concrete be used for the façade. The technology, developed by Finnish architect and inventor Samuli Naamanka, chemically etches patterns and imagery into the concrete surface. The chosen design was a 40-foot mural



with a flower pattern created by Spanish-born artist Dani Marti.

The next step was for National Precast Concrete Association Australia member Austral Precast’s Queensland plant to manufacture the precast concrete panels that formed the façade. Since the graphic concrete technology was new in Australia, the challenge was making sure the imagery flowed seamlessly across more than 30 precast panels.

“There are a lot of ways to get a pattern on concrete, but there are not many ways to get this level of detail and intricacy of pattern on a concrete panel,” said Alex Gorton, the project’s contract administrator for Westfield Design and Construction.

The process includes three steps:

1. The image was scaled proportionately and cast using custom formliners.
2. An etching technique was employed where a chemical reaction occurs within the concrete as it cures in the form. A retarding chemical slows the setting in selected areas. Upon removal from the form, the softer, unset concrete surface is pressure washed to reveal the fine-aggregate finish.
3. A color finish was applied to the rebated edges to match the background color of the aggregate finish.

Gorton said that initially there were “a few hesitations” that everything was going to work, but the process went smoothly.

“I was waiting for it to go wrong at every point, but it came out great,” he said. “Everyone comments on how good it looks.”

The panels were installed over three nights and the mural is highly visible from two of Brisbane’s busiest roads. Westfield Garden City is thrilled with the finished product and shoppers are excited about the new retail environment. **PI**

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

RESOURCES:

[1 dublinairport.com/latest-news/detail/record-2016-for-dublin-airport-with-almost-28m-passengers](http://1.dublinairport.com/latest-news/detail/record-2016-for-dublin-airport-with-almost-28m-passengers)



The abstract flower pattern, designed by Spanish-born artist Dani Marti, spans across 30 precast concrete panels, each nearly 40 feet high.

Photos courtesy of National Precast Concrete Association Australia



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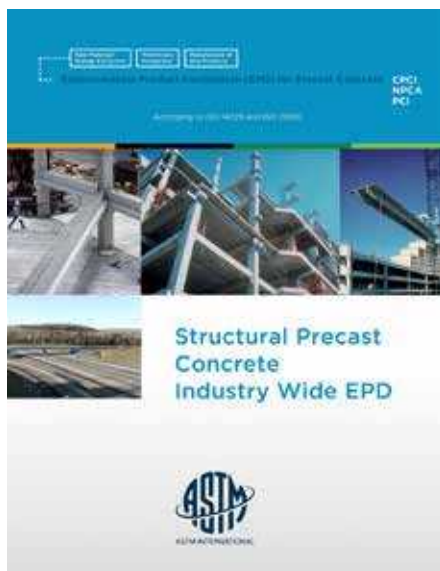
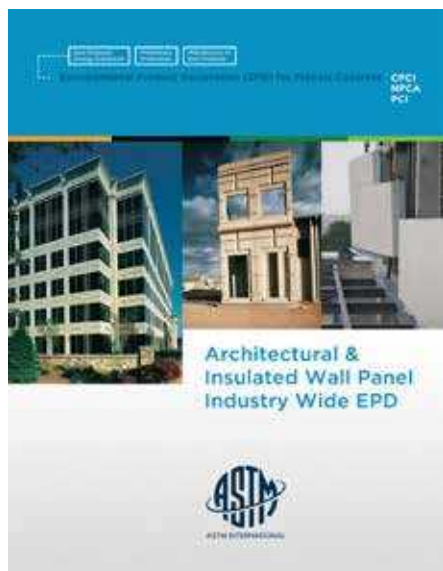
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EPDs May Become Mandatory in California:

Is Your State Next?

By Claude Goguen, PE., LEED AP

At times, the National Precast Concrete Association Sustainability Committee acts as a precast prognosticator to foresee how green construction will evolve and impact our industry. Most member resources the committee creates are developed for emerging or future needs.

For example, in 2010, all indications showed that the construction industry was moving steadily toward sustainability with an emphasis on transparency. In response, the Sustainability Committee partnered with the Precast/Prestressed Concrete Institute and the Canadian Precast Prestressed Concrete Institute to develop a life cycle assessment of precast concrete structures.

A few years later, the committee worked with the same partners to create three environmental product declarations for precast concrete. The EPDs enable architects, engineers, building owners and other specifiers to understand and document the environmental impacts of precast concrete products.

Requests for EPDs were sporadic, but committee members wanted

precast producers and suppliers to be ready when the frequency of EPD requests increased. Requests have increased, and recent legislative action may generate another boost.

In January 2017, Assemblymembers Rob Bonta and Susan Eggman introduced the Buy Clean California Act (AB-262), which would require state agencies and universities to evaluate greenhouse gas emissions or products purchased with state funds.

This is a first-of-a-kind effort to address environmental impacts with public infrastructure projects.

“California has been a leader in fighting climate change and AB-262 will further demonstrate our resolve by requiring our state government to consider whether products were made in clean or dirty factories when making infrastructure purchases,” Bonta said in a statement posted on buycleancalifornia.org.

Companies bidding on state contracts would be required to report greenhouse gas emissions generated by the manufacturing and transportation of supplies. Officials would then factor that information

into their decision when selecting materials and suppliers.

The bill would require that by Jan. 1, 2019, the Department of General Services would establish and publish a maximum acceptable global warming potential for each category of eligible materials. That list of eligible materials does in fact include precast concrete. On or after that date, successful bidders would have to submit a current EPD developed in accordance with specified standards. As of press time, the bill was still under construction in the California legislature.



Think of an EPD like a food label.

It enables a comparison of environmental impacts based on the same key indicators – just like comparing calories, carbs or sugar from one box of cereal to another.

A SUSTAINABLE HISTORY

Sustainability-based laws are nothing new for the state of California. A previous executive order issued by California Governor Jerry Brown stipulates that: “State agencies shall take climate change into account in their planning and investment decisions and employ full life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives.”

In this instance, “full life-cycle accounting” refers to the consideration of impacts across the entire life of a product, including raw material acquisition, manufacturing, delivery, installation, use, demolition, and recycling or disposal. This process is also known as an LCA.

The LCA enables decision makers to choose construction materials based on the entire picture and avoid selecting products based on short-term impacts and performance.

An LCA helps the end user:

- **Compile an inventory of relevant energy** and material inputs and environmental releases
- **Evaluate the potential environmental impacts** associated with identified inputs and releases
- **Interpret the results** to help decision-makers make a more informed decision¹

WHAT THIS MEANS FOR YOU

The language in proposed bill AB-262 states: “An awarding authority shall require the successful bidder for a contract described in subdivision (b) to submit a current, facility-specific Environmental Product Declaration, Type III, as defined by the International Organization for Standardization (ISO) standard 14025, or similarly robust life cycle assessment methods that have uniform standards in data collection consistent with ISO standard 14025, industry acceptance and integrity for each eligible material proposed to be used.”

Think of an EPD like a food label. It enables a comparison of environmental impacts based on the same key indicators – just like comparing calories, carbs or sugar from one box of cereal to another. ISO 14025 defines an EPD as quantifiable environmental data used to compare products that fulfill the same function. EPDs are created based on a Product Category Rule and an LCA. NPCA needed actual plant data to create EPDs, and 20 members stepped up and provided that critical information. Those 20 companies are now listed within the actual EPDs.

The EPDs contain information on potential production impacts such as:

- **Global warming**
- **Acidification**
- **Eutrophication**
- **Smog creation**
- **Ozone depletion**
- **Primary energy consumption**
- **Material resources consumption**
- **Waste generated**

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There are three main types of EPDs.

Type I EPDs are written in compliance with ISO 14024 and are called environmental labels. They are often referred to as eco-labels. They are product-specific, third-party verified and endorsed to indicate the product has met set predetermined requirements and is environmentally preferable within a specific product category.

Type II EPDs are self-declared environmental claims and fall under the guidance of ISO 14021. These do not require third-party verifications and are also product-specific.

Type III EPDs are sometimes called industry-wide EPDs and should comply with ISO 14025. These types of EPDs present quantified environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function. This EPD is what bill AB-262 requires and NPCA has EPDs available for members for the following: underground precast concrete products, structural precast concrete products, and architectural and insulated precast wall panels. These can be found at precast.org/epds.

The EPDs were independently prepared by Athena Sustainable Materials Institute in accordance with ISO 14025. They were also independently verified in accordance with ISO 14025 by ASTM International and Industrial Ecology Consultants. The EPDs are valid until 2020. The NPCA

Sustainability Committee will be looking for more data contributors for the next version of these EPDs. Having your name as a data contributor gives you an edge when using them, so please consider signing up. NPCA professional staff will walk you through the process and provide a spreadsheet that will indicate what metrics need to be recorded.

NPCA members are always invited to share their experiences with the committee. As we learn more about this evolving tendency, the Sustainability Committee will continue to gaze into the green crystal ball and develop tools to position NPCA members to continue supplying sustainable products for a sustainable market.

For any questions about this or any other sustainability-related topics, contact Claude Goguen, P.E., LEED AP, director of sustainability and technical education, at cgoguen@precast.org or at (317) 582-2328. **PI**

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

REFERENCES:

- 1 Science Applications International Corporation, & Curran, M. A. (2006). *Life-cycle assessment: principles and practice*. Cincinnati, OH: National Risk Management Research Laboratory, Office of Research and Development, US Environmental Protection Agency.

Interested in being an EPD data contributor?

Having your name as a data contributor **gives you an edge** when using them, so please consider signing up.

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Tightly Connected

NPCA members work together to implement a precast solution for a large-scale wastewater project with difficult site conditions in Maryland.

By Mason Nichols

Photos courtesy of Mayer Brothers Inc.

After a relaxing weekend, you wake up Monday morning full of optimism and vigor. You eat a healthy breakfast, pour some coffee and start the car for the commute to work.

As you pull out of the driveway, your phone rings. It's a coworker. He warns you about a traffic jam on your route. Thanks to his heads up, you take a different road and arrive on time for your 8 a.m. meeting.

When you arrive at home later that day, you continue the improvement project you started over the weekend, but the tool you need stops working. Luckily, your neighbor lends you his tool to finish before the sun sets.

Navigating through life's many obstacles can be challenging. Thankfully, we can rely on others to help us reach our goals. Such is the case in the precast concrete industry, where precasters turn to peers for advice, support and occasionally, direct assistance.

COMING TOGETHER

For more than 30 years, Nancy Mayer, president of Elkridge, Md.-based Mayer Brothers Inc., has worked hard to ensure the continued success of her company. During that time, she has also focused on building her industry network through the many opportunities made available by the National Precast Concrete Association.

"I've served on a lot of different committees and the board, so over the past 30 years, I've gotten to know a lot of people," she said. "I've built a lot of great relationships and made a lot of friends."

One of those friendships took root in 2007 at NPCA's

42nd Annual Convention on Maui. There, Nancy and her husband connected with Ginger and Tommy Jarrett of Ashland City, Tenn.-based Jarrett Concrete Products and Supply. Though Nancy had met Ginger and Tommy separately at previous events, she never had the opportunity to speak with both at the same time. The resulting conversations turned what was a simple work relationship into a close friendship.

Ginger said she and Tommy immediately knew that Nancy brought plenty of information and business acumen to the table. As a result, Nancy and the Jarretts continued learning from one another and working together in the years after the convention.

"We would visit each other's plants and bounce ideas off one another," Ginger said. "I found Nancy to be a wealth of knowledge."

As a result of those conversations, Nancy and Ginger eventually worked together on a project involving the use of a new, innovative precast concrete solution developed by Jarrett Concrete.

THE PERFECT SOLUTION

As on-site wastewater development ramped up in the '90s, Tommy recognized an industry need for a higher-quality precast tank, so he began devising plans for a new product. He perfected his design over the years, eventually deciding on a one-piece solution. The system, called Top Tight, is manufactured with risers cast in and no joints in the boots. It is particularly useful on projects with difficult site conditions.

In recent years, Jarrett Concrete manufactured hundreds of Top Tight tanks for a housing development in Mississippi. The tanks performed well and remained watertight even with the site's high water table.

Despite Top Tight's proven effectiveness, Ginger and Tommy needed a push to get the product into more markets – a problem they had discussed with Nancy. Nancy's advice was to obtain a patent for the system, which could then be licensed to precasters interested in



using it on their projects.

Nancy had worked with Rodney Smith of Smith-Midland Corp. decades earlier to obtain patents on two of her own products, so she connected the Jarretts with Smith to help walk them through the process.

“Ginger and Tommy visited me and we went out to meet with Rodney, who was delightful and very helpful,” Nancy said. “He opened his doors to them and hooked them up with the same patent attorney we had used years ago.”

Ginger expressed deep gratitude for Smith’s assistance.

“I found his information and time to be invaluable, and I’m forever grateful for him visiting with us,” she said. “He was instrumental in all of this.”

With Smith’s help, the Top Tight system is currently patent pending.

SOUTHERN KENT ISLAND

In 2016, Nancy learned about a job on Southern Kent Island in Queen Anne’s County, Md. The \$34 million project called for the installation of more than 700 on-site wastewater tanks over the course of four years. Each of the tanks will be connected into a new, 8-mile-long sewer line leading to a wastewater treatment plant. Initially, Nancy had no interest in the job.

“The contract specifications were really tight, because, essentially, these tanks are going underwater in some places,” she said. “They absolutely have to be watertight, and I know how hard it is to make a regular tank perfectly watertight 100% of the time.”

But the Jarretts knew about the project too, and were confident the Top Tight system would be the perfect

The high water table on Southern Kent Island means that many of the project’s more than 700 on-site wastewater tanks will be installed underwater. But thanks to an innovative design, the Top Tight tanks will remain watertight.

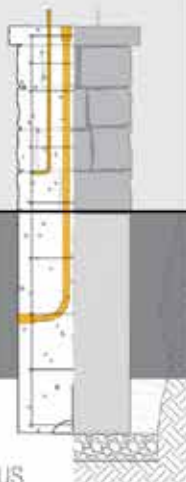
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Operations Manager
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solution. Plus, they were sure Nancy and Mayer Bros. would do excellent work.

"I knew that Nancy would manufacture the product correctly and with the highest quality," Ginger said.

With the support of the Jarretts and the many advantages of the Top Tight system in mind, Mayer Bros. became the first Top Tight franchisee and placed a bid. Two other traditional tanks were preliminarily approved, but Mayer Bros. won the contract to manufacture all the tanks for Phase I of the Southern Kent Island project.

The timing couldn't have worked out better for Nancy's company, which had relied on the production of another type of on-site tank for years. But that product line had experienced a steady decline in sales.

"We had let the advanced treatment systems become a huge part of our business, but the governor of Maryland slashed the market for them," she said. "Overnight, with one proclamation from the governor, we lost a lot of business. The fact that this contract was coming saved us."

The result is a product that perfectly fits the needs of Mayer Bros. and Southern Kent Island. In addition to being consistently watertight, the Top Tight tanks also boast incredible strength. Because the tanks move wastewater from each home to the treatment facility, they are mostly empty. This, combined with external forces from the soil, means each tank is under a considerable amount of pressure similar to the loading conditions experienced in a traffic-bearing location. But thanks to the tank's innovative design, it can stand up to these conditions and provide a long-term, durable solution for homeowners.

Mayer Bros. is committed to producing six Top Tight tanks for the project each week. All parties, including the precaster, contractor and owner, are pleased with the work completed thus far.

A LITTLE HELP

Before 2016, Ginger wasn't actively involved in NPCA.

"Ginger and Tommy used to come to the conventions, but they weren't on any committees and didn't participate that much," Nancy said. "Each year, as Ginger wrote her checks [NPCA association dues], she would say, 'I don't know if it's worth it. I don't think I'm going to do this again.'"

But Nancy offered Ginger one key piece of advice that changed her outlook on the future and inspired her to engage more with the association.

"Ginger, you're going to get twice back what you put into it, but if you put nothing in, you're going to get twice nothing in return," she said.

As a result, Ginger is now an engaged member of the NPCA Water and Wastewater Product Committee and works hard to positively impact the precast concrete industry. She has seen the association's value first-hand and is eager to participate.

Thanks to their ongoing relationship, both Nancy and the Jarretts are getting plenty in return, offering more proof that we can all get by with a little help from our friends. **PI**

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



Working For You

The NPCA professional staff works to expand the use of quality precast concrete products in many ways. To keep you informed of these ongoing efforts, we created the **Working For You** page at precast.org/working-for-you.

The page highlights news about staff activities and lists all federal, state and local entities that require various types of NPCA Plant Certification. Metrics regarding our education of specifiers and students, work on codes and standards, specification changes and NPCA's marketing efforts are also included.

In each issue of Precast Inc., we will recap updates added to the page. To read the full stories or learn more, visit the Working For You page.

Certification and Specifications

NPCA Plant Certification Receives Major Recognition

For the past six years, NPCA's director of certification & regulatory services, Rich Krolewski, has been working with ARCOM, which operates the MasterSpec program, on the inclusion of NPCA Plant Certification. Architects and engineers use MasterSpec to create specifications and choose from prequalified certification programs.

NPCA received notice this week, after a rigorous review and documentation process, that NPCA Plant Certification is now included.

This means that when the thousands of clients who use MasterSpec select certification for precast products, NPCA Plant Certification will be an option. The change will push NPCA certification into more specifications.

"The addition of NPCA's certification program is a significant boost for NPCA Certified Plants and a high-level recognition of the program," said Ty Gable, president of the National Precast Concrete Association. "This was no easy task. It took persistence and lots of documentation, but the end result achieved on behalf of our members is substantial."



Specifier and Student Outreach

NPCA professional staff members have given six in-person presentations to 448 specifiers and produced one webinar that reached 307 specifiers. Professional staff also presented to 137 students at Illinois State University and Purdue University.

Marketing

Visits to precast.org via Google ads are up from 2016 and reached 72,972 clicks leading the end user to precast.org by the end of May. The conversion rate of these ads is also up from 1.5% in 2016 to 1.76% in 2017.

Codes and Standards

As of May 31, NPCA professional staff members have attended or been on conference calls for 17 meetings and are actively participating on 37 groups, committees, etc.

Other Activity

NPCA professional staff exhibits at trade shows

The technical staff has been busy representing NPCA and the precast industry at a variety of shows, including the Water & Wastewater Equipment, Treatment & Transport Show (WWETT); World of Concrete; Missouri Smallflows Annual Conference and Trade Show, and more. The four trade shows in which NPCA exhibited drew a combined 14,103 attendees.

NPCA engineers attend ACI Spring Meeting

NPCA professional staff members Eric Carleton, P.E., Kayla Hanson and Claude Goguen, P.E., LEED AP, attended the ACI Spring 2017 Concrete Convention and Exposition.

NPCA representatives visit D.C. to advocate for precast

NPCA President Ty Gable and leaders from nine other concrete-related trade associations met with staff members from the U.S. Senate in Washington, D.C., to educate and advocate on behalf of infrastructure and concrete. The event preceded the North American Concrete Association's Cement and Concrete Fly-In, where industry representatives including Bob Whitmore, NPCA vice president of communication and public affairs, visited Congressional offices to talk about how Congress and the industry can work together.





The 2017 Leadership NPCA class met in Santa Fe, N.M., for their first bootcamp.

Molding Precast Concrete LEADERS

The **NPCA Leadership Academy** provides precast professionals another opportunity to improve their workplace and the precast industry.

Confidence, honesty and focus are critical qualities for great leadership, but leaders also need to recognize and understand their own emotions before successfully directing others. This is defined as “emotional intelligence,” and it’s the foundation of the NPCA Leadership Academy, National Precast Concrete Association’s newest education program. The program creates a unique opportunity for employers of NPCA member companies to advance their careers and is a logical next step after Precast University in developing leaders within the precast concrete industry.

The program is based on the teachings of Jeff Patnaude of The

Patnaude Group and dives into the message that managers and leaders need to first manage the business of themselves before coaching and developing others. Instructor Mike Renquist of The Patnaude Group said the Leadership NPCA program offers precast concrete professionals basic foundational tools for leadership and management and inspirational and aspirational direction for self-development.

“The group extends themselves by composing after reflection a 500-word values and purpose statement in their respective organizations as they are challenged to seek significant change,” he said. “And this statement follows them throughout the program

“What they end up doing in this triad is building life-long relationships. I know some triads that are still meeting even long after the program finished.”

– Mike Renquist, *The Patnaude Group*

as they address how they are going to make that change happen.”

The inaugural Leadership NPCA class is currently underway following a kick off meeting at The Precast Show 2017 in Cleveland. The group attended one bootcamp in Santa Fe, N.M., already and will complete another in Fort Lauderdale, Fla. It will also meet at the 52nd Annual Convention in Atlanta.

Eric Lasko, quality control manager at Monarch Concrete Products Corp. in Allentown, Pa., said the first bootcamp in Santa Fe was an amazing experience and opened his eyes to his individual leadership personality traits.

“The key thing that I got out of the trip was more self-awareness of what I am and that was through a personal identification layout that we completed,” he said. “It was also great to know my peers and their abilities and goals as well. We actually all have the same goal to improve our industry.”



Precast professionals receive management training, industry association experience and networking opportunities.

2017 NPCA Leadership Participants

Jeremy Chilton	<i>Sika Corp.</i>
Jason Cross	<i>Norwalk Concrete Industries</i>
Andrew Gillespie	<i>Gillespie Precast</i>
Cyndi Glascock	<i>Gainey's Concrete Products</i>
Richard Isaacson	<i>iwi group</i>
Megan Kitchner	<i>Atlantic TNG</i>
Eric Lasko	<i>Monarch Precast Concrete</i>
Pattie McGinnis	<i>Smith Midland Corp.</i>
Mark Ronning	<i>ALP Supply</i>
Justin Weberg	<i>Dalmaray Concrete Products</i>
Drew Wieser	<i>Wieser Concrete Products</i>
Dean Wolosiansky	<i>Lindsay Precast</i>

Along with in-person meetings, the class is split into triads. Each triad has monthly phone calls to reflect and talk about personal or workplace challenges.

“What they end up doing in this triad is building life-long relationships,” Renquist said. “I know some triads that are still meeting even long after the program finished.”

Participants must have a minimum of three years of continuous employment within the precast industry to be considered. The program is open to everyone from those who have been in the industry for 20 years to those who just entered a leadership role. No matter their experience level, they all benefit from exposure to the program’s dynamics, briefings, exercises and growth opportunities.

“It’s amazing to see the wonderful relationships that grow even though there may be differences in age, gender and experience,” Renquist said.

The application period for the 2018 Leadership NPCA class will open this fall. For more information about Leadership NPCA and the NPCA Leadership Academy, visit precast.org/npc-leadership-academy. ■



For more information about Leadership NPCA and the NPCA Leadership Academy, visit

precast.org/npc-leadership-academy

THANK YOU

Leadership NPCA would not be possible without the financial support of the NPCA and NPCA Foundation Boards.



Mitch Rector

NPCA WELCOMES NEW TECHNICAL SERVICES ENGINEER

NPCA recently hired Mitch Rector to its Technical Services staff.

Rector graduated with a bachelor’s degree in civil engineering from Purdue University and joined NPCA as a technical services engineer in June. He provides NPCA members and industry professionals with technical support, and also assists with technical publications, interpreting codes and standards, and represents NPCA and the precast industry at trade shows and conventions.

Prior to joining NPCA, Rector worked closely with professors and graduate students to research different types of concrete behavior and performance.

2017 NPCA WEBINAR Schedule

DATE	TOPIC	INSTRUCTOR	PRICE
July 13	Best Practices When Using Fiber Reinforcement	Claude Goguen, P.E., LEED AP	\$89 Per Location
Aug. 17	Troubleshooting Your SCC	Paul Ramsburg	\$89 Per Location
Sept. 14	How to Become the Smartest Person in Your Plant: Calculating the Center of Gravity	Claude Goguen, P.E., LEED AP	\$89 Per Location
Oct. 19	How Your Local Manufacturing Extension Partnership (MEP) Can Help You Pay to Train Your Employees	TBD	\$89 Per Location
Nov. 2	Alternate Types of Cement	Evan Gurley	\$89 Per Location
Nov. 7, 9, 14, 16*	PQS II – Technical**	Claude Goguen, P.E., LEED AP	\$495 Per Person
Dec. 7	Sales and Marketing Alignment: A Key to Revenue Growth	TBD	\$89 Per Location

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

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

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

All webinars begin at noon Eastern.

For course descriptions and registration, visit precast.org/2017webinars.

Think you know your stuff?

Prove it by answering the following question.

Send your response to Kayla Hanson, technical services engineer, at khanson@precast.org, and if yours is the correct answer (chosen randomly from among all correct answers), you will receive one free admission to one of our 60-minute webinars presented in 2017. We will accept one answer per person. **Good luck!**

Challenge Question:

Today you will be pouring structures with a mix design that includes the following in each cubic yard. Aggregate weights are at saturated surface dry (SSD).

Water	276 pounds
Cement	620 pounds
Coarse Aggregates	1945 pounds
Fine Aggregates	1245 pounds
Total:	4086 pounds

You take a sample of sand and coarse aggregates and weigh them. You then burn off the moisture and weigh them again.

You get:

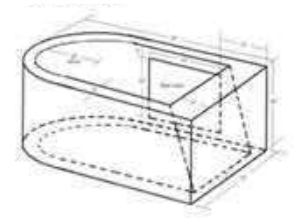
Coarse Aggregates	As sampled 18.62 pounds	Oven dry	18.39 pounds
Fine Aggregates	As sampled 12.54 pounds	Oven dry	12.01 pounds

From the aggregate mill certs, you find that the absorption capacities of each are: CA 0.95% and FA 2.1%. The target water-cement ratio is around 0.45.

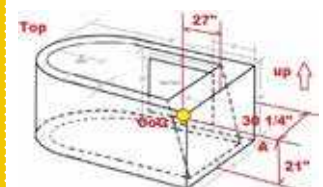
Based on the tests and data, what would the w/c ratio be if no adjustments were made due to moisture?

MAY/JUNE CHALLENGE

QUESTION: Find the center of mass of the following figure.



ANSWER:



From point A, 21" up, 30 1/4" to the front, and 27" towards the top



ATLANTA AWAITS!

NPCA 52nd Annual Convention

Oct. 12 - 14, 2017

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Early Bird Deadline
Sept. 13, 2017





A Little Outreach, **A MAJOR IMPACT**

Lindsay Precast and the **National Precast Concrete Association Foundation** are teaming up to **educate** the next generation.

By Kirk Stelsel, CAE

When Mike Hoffman, vice president of corporate development for Lindsay Precast, thinks about the future of the precast concrete industry, he tends to focus on students. In particular, he sees students majoring in engineering, architecture or construction-related programs as both future decision-makers who will impact the industry and potential employees.

This view puts Hoffman and Lindsay Precast in line with the National Precast Concrete Association Foundation's mission. A recent collaboration between Lindsay Precast and NPCA enabled Hoffman to develop a relationship with a college near Lindsay's Canal Fulton, Ohio, plant.

Hoffman was already trying to cultivate a relationship with Stark State College's engineering department when Marti Harrell, executive director of the foundation, reached out to offer free tickets to The Precast Show 2017 for students around the Cleveland area. Hoffman jumped at the chance to offer tickets to Geoff Wopershall, P.E., an associate professor at Stark State.

"I'm passionate about introducing the precast industry to up-and-coming specifiers," Hoffman

said. “I initially thought I’d get Geoff involved with The Precast Show, but he took it a step further by bringing his students.”

Stark State offers ABET-accredited associate degrees in civil engineering technology and pre-engineering. Following graduation in two years, students can either enter the workforce or continue studying for a bachelor’s degree in engineering. The faculty at Stark State focuses on practical, real-world applications to prepare students and relies heavily on industry feedback. As a result, the opportunity to attend The Precast Show was an excellent fit.

“When Mike Hoffman called me about The Precast Show coming to Cleveland, I knew it was a perfect opportunity to show my students what the precast industry is all about,” Wopershall said. “Through the generosity of NPCA Foundation, my students were able to attend a national event and see the wide variety of products found in the precast industry. To be honest, my students were wide-eyed when they saw the trade show floor.

“They couldn’t believe all of the industries affected by precast concrete. The ability for my students to talk directly to industry professionals really excited them.”

After the successful visit to The Precast Show, Hoffman and Wopershall worked on how to further the relationship for the benefit of the students. Wopershall visited Lindsay’s Canal Fulton facility and plans to bring students soon. In addition, representatives from Lindsay will be guest speakers to supplement the precast concrete curriculum.

“The benefits are invaluable for everyone involved,” Wopershall said. “As a college, we obtain closer ties to a local employer and we can tweak our curriculum to help meet the needs of the industry. Lindsay Precast gets to share its story with the next generation of technicians and engineers in the field and our students gain a greater appreciation for the precast industry while making their education more tangible.”

Wopershall said he and his students are already looking forward to future collaborations and that students are discussing applying for 2018 NPCA Foundation scholarships. Hoffman also couldn’t be more pleased with the results and encourages other precasters to get involved with local schools. While this relationship is a great example of success, it’s only a portion of Lindsay’s ongoing outreach with area schools.

The company has supported local schools entering in the American Society of Civil Engineering’s National Concrete Canoe Competition for many years through donations of products like fiber



NPCA file photo



Students at Stark State College are introduced to concrete as a building material in many ways, including a concrete Frisbee competition.

Photo courtesy of Stark State College

reinforcement. It plans to develop deeper relationships with other area schools as well, including Akron University and Kent State. Hoffman also sees connecting with students pursuing other engineering degrees down the road, such as electrical engineering. He envisions sharing Lindsay’s work with solar skids – even if it’s just to show such students that precast concrete exists and that it’s an example of what they could expect to work on in their careers.

“Over time, these relationships will add up to a major impact on the industry and it takes nothing out of your day to do this,” Hoffman said. “Start with the professor, be persistent if you have to, and invite them to come see your plant. Ultimately, a plant tour with the students is the best and the relationship can grow from there.” **PI**

Kirk Stelsel, CAE, is NPCA’s director of communication and marketing.

“When Mike Hoffman called me about The Precast Show coming to Cleveland, I knew it was a perfect opportunity to show my students what the precast industry is all about.”

– Geoff Wopershall, P.E.,
associate professor at
Stark State College

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.

Two Longtime Members Pass

Arthur Miller Sr.



Arthur "Art" Miller Sr.

Arthur "Art" Miller Sr., founder of A.C. Miller Concrete Products Inc., passed away peacefully at home in Birchrunville, Pa., on May

7, 2017, at the age of 85. Miller founded A.C. Miller in 1966 and thanks to his innovation, vision and perseverance, what started as a small precast septic tank manufacturer grew into one of the Mid-Atlantic region's biggest independent precasters, with two locations.

Dale Camp



Dale Camp

Dale Camp who, with his wife, Mary, founded Camp Precast Concrete Products in Milton, Vt., passed away peacefully on June 5,

2017. A true entrepreneur, Dale started his first business at age 11, purchased a 400-acre dairy farm at 16, paid off and sold the farm and then started a career as a mason. In 1968, Dale and Mary founded Camp Precast Products, which they ran until 1996, when they passed the company to sons Kevin and Patrick.

OLDCASTLE PRECAST REVAMPS MARYLAND FACILITY

Oldcastle Precast has re-equipped its production facility in Edgewood, Md. The new equipment results in a National Precast Concrete Association-certified production facility that now manufactures underground precast concrete products available to customers in the Maryland area. Located on 40 acres, the 100,000-square-foot indoor facility includes five bridge cranes and two concrete mixers.



HAWKEYEPEDERSHAAB PROMOTES BRAD SCHMIDGALL TO PRESIDENT

HawkeyePedershaab Concrete Technologies announced Brad Schmidgall has been promoted to president. Based in St. Louis, he will lead the company's sales, engineering and service groups while working alongside Ryan Gable, CEO and BW Forsyth Partners managing director.



Brad Schmidgall

Schmidgall joined the company 16 years ago. He has worked out of both the Iowa and Denmark offices and has been part of various departments, including engineering, marketing and sales. He recently served as the executive vice president of sales.

GCP APPLIED TECHNOLOGIES EXPANDS PRODUCTION CAPACITY IN TENNESSEE

GCP Applied Technologies Inc. held a groundbreaking ceremony for the expansion of its manufacturing plant in Mt. Pleasant, Tenn. The expanded facility will feature a new production line dedicated to manufacturing GCP's range of waterproofing membranes. The new production line is scheduled for completion in April 2018.

MEADOW BURKE OPENS NEW HEADQUARTERS



Meadow Burke has combined its manufacturing, distribution, engineering and business support functions in a new facility in Riverview, Fla.

The 48,000-square-foot facility incorporates manufacturing capabilities to provide shorter lead times on products prevalent in the Southeast, in addition to custom products. The distribution center features innovative racking for efficient inventory management.

SHUTTLELIFT REINFORCES SUPPORT AND MAINTENANCE THROUGH ANNUAL SERVICE SCHOOL

Shuttlelift's Customer Care team recently concluded an annual service school at its manufacturing facility in Sturgeon Bay, Wis. The school is conducted as part of a continued effort to keep distributors and service technicians trained on the latest industry innovations to best serve customers worldwide.

The two-week course included the introduction and troubleshooting stages of a variety of new machine improvements across all Shuttlelift product lines.

BIBM CONVENES IN MADRID, SPAIN

More than 650 precast industry producers and suppliers met in Madrid, Spain, May-17-19 for the 22nd BIBM Congress, a trade show and technical convention held every three years in Europe. With a theme of sustainable production, attendees learned about European market conditions, policy



developments and future opportunities.

In addition to 30 technical presentations and three plenary sessions, BIBM featured 60 exhibitors offering the latest information for the planning, design, manufacture and installation of modern precast structures. The event was sponsored by the European Federation for Precast Concrete and organized by Concrete Plant International. Photos and presentation materials are available at www.bibmcongress.eu. **PI**

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THE PRECAST SHOW 2018
 Colorado Convention Center
 Denver, Colo.



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



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



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

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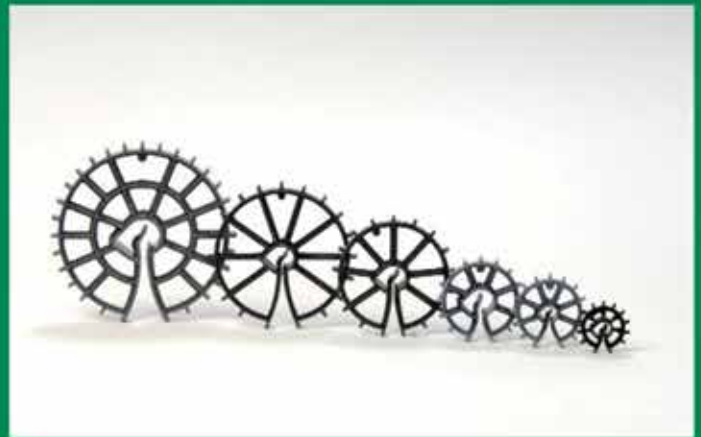
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