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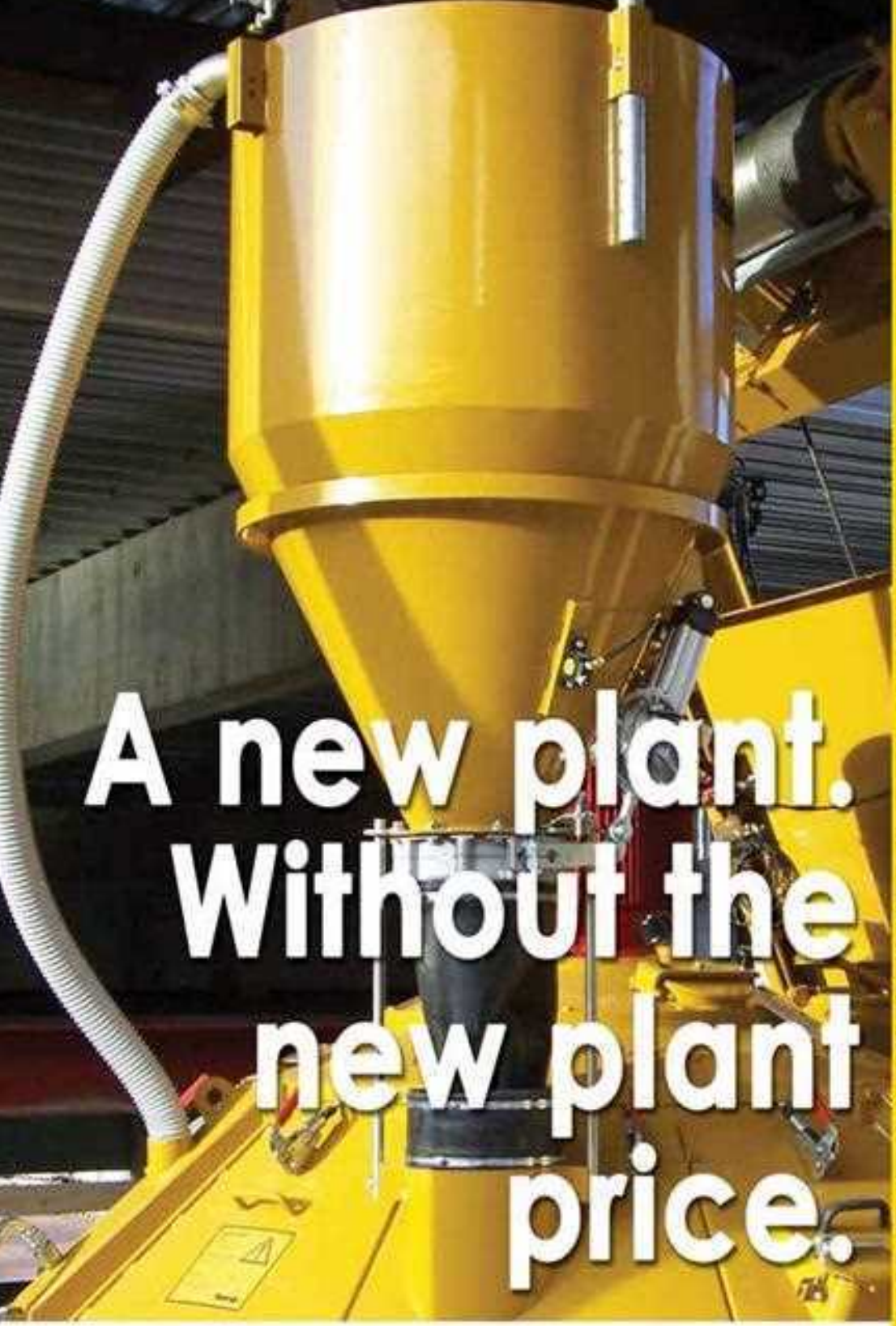
NPCA 50 SPECIAL ANNIVERSARY ISSUE: *Celebrating 50 Years of NPCA*

Staying Safe in **CONFINED SPACES**

+

MOISTURE PROBES How to Ensure Quality



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THE PRECAST SHOW

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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.

36 CHICAGO'S RIVERWALK

Walk This Way

Precast concrete products play a significant role in constructing Chicago's downtown riverwalk.

See how it all began! NPCA Celebrates 50 Years
page 53

On the Cover:

To construct Chicago's riverfront promenade, engineers needed to build land on water. Their solution? Precast concrete tubs weighing up to 175,000 pounds.

Photo credit Chicago Department of Transportation

Correction:

In the July/August 2015 of Precast Inc. (Understanding Carbonation, page 10) calcium hydroxide was incorrectly described as a desirable product of cement hydration. Calcium hydroxide is viewed as an undesirable product.

EVOLUTION
Celebrating 50 Years of NPCA
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Precast PIONEERS

Charles Rainero, NPCA President, 1987

Charles Rainero

EDITOR'S NOTE:

NPCA celebrated **50 years** at its Annual Convention in Minnesota in October.

This year-long series concludes with **past chairman** who served NPCA through 1990.

1.) Tell us what the precast industry was like when you got started.

The precast industry was smaller than it is today. Companies were more locally owned. Products were smaller and less complicated. There was less emphasis on standards, quality, safety and inspection. Precasters had no common voice with specifying agencies.

We were a concrete pipe company with mostly machine-made products. Our sales territory was much smaller and our product line was limited. Products that we routinely supply today were constructed in the field. There was plenty of skilled labor and contractors had a mindset against using precast.

2.) Why did you get involved with NPCA and decide to become chairman?

Rodney Smith, of Smith Cattleguard Co., called and asked me to join the National Precast Concrete Association, which was going to Europe on a study tour with BIBM, the international concrete congress. I joined and went on an 18-day trip with a group of strangers who would turn out to be lifetime friends. From then on it was trips, plant tours, meetings all over the world and a true learning experience. It was also a chance to build my business.

I did not just decide to become chairman. It was a natural progression from participation in the sections and committees, work on the Planning Council, serving on the Board and serving on the Executive Committee that led to going through the chairs to chairman.

3.) What was the best thing you accomplished as chairman?

I cannot take credit for most of what was accomplished during my term as chairman because it was a team effort among myself, our Board of Directors and our past chairmen helping to steer our course. Highlights of my chairmanship included establishment of NPCAEF, or our Scholarship Fund as it was first called. Mary Beth was instrumental in founding the partners group of NPCA Spouses, which was enjoyed for many years.

4.) What's your favorite NPCA memory?

My favorite NPCA memories include time spent on our first BIBM trip to Switzerland, Austria and Germany getting to know the members, seeing my daughter Mimi Coles become NPCA Chairperson, seeing my wife Mary Beth receive the Yoakum Award and receiving the Yoakum Award myself.

5.) How has precast as a product changed over the years?

Precast has withstood the test of time, all the while improving with new methods, new designs, new admixtures, a concentration on quality and plant safety, and a network of precasters and associates who join together to promote the acceptance of our products.

6.) How did the friendships formed via NPCA impact your business and life?

NPCA is one extended family to us. When we travel we have friends in every city. When we need some information about our work, we can always remember a plant where they have already "invented the wheel" and are ready to help their fellow precaster with a solution to the problem.

7.) When you first got involved with NPCA, did you envision it becoming what it is today?

When we first joined NPCA, we saw a bright future for the group because lots of parents brought their children to the meetings as a vacation. Through the years, those children have become the new leaders of our industry with fresh ideas to guide us to greater heights; building the network for the future and continuing to represent the spectrum from small, family-owned plants to multiple operations. **PI**

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Roland Lindsay, NPCA President, 1988


NPCA file photo

Roland Lindsay

1.) Tell us what the precast industry was like when you got started.

Everybody was afraid of precast and didn't want to experiment with it like you have to do.

There were two companies in my area that made septic tanks, which was the big thing then. They were really rough at it and they had forms that were super expensive – it took so much labor to pour them and it made such an inferior product. I kept watching to see how they were doing it and I thought, "Boy, if those guys can sell those things …" I said if I couldn't make something decent, I wasn't going to make anything, so I started making septic tanks. Tom Lendrum's dad helped me get started. He sold me a mold and I bought a used truck from another septic tank company. My wife, Linda, has always been an important part of our business and has greatly contributed to our success!

2.) How has precast as a product changed over the years?

There was no company like Spillman that built forms back then. They were just getting started. Buying fork trucks and molds that met the codes helped me a lot. We were able to produce bigger and different products.

3.) Why did you get involved with NPCA and decide to become chairman?

I had a cement salesman come in one day and he said, "Did you hear about this meeting they're having?" I said, "No." He told me the precasters were going to organize. I asked him if he had a phone number I could call to get some information. He gave me Bob Yoakum's phone number. I called him and he invited me to the meeting. It sounded good. Linda and I went to the meeting and talked to a lot of people. We had a good meeting, although Mr. Yoakum died.

I learned a lot about mixing concrete because I had done a lot of experimenting, but these guys were experts. There were quite a few engineers and they were generous with their knowledge. I got to know Tom Lendrum at the first or second meeting and we've been friends for years. I got involved because I thought I could learn more from members than I could any other way with no cost involved. They were all good people and very generous with their experiences.

4.) How did the friendships you formed via NPCA impact your life?

I don't know if I learned more from them or they learned more from me. I enjoyed getting to know a lot of people. It is great to think I might have helped people. I think I've been to every Convention except for last year. I went mostly to see people I knew and to see what was new. There were a lot of good people and I miss them. Where I gained the most in this business was from NPCA.

5.) What's your favorite NPCA memory?

Years later, after we had met at a show and were getting along pretty well, Joe Wieser and I talked about having our own plant tour. So, one year I called him and said, "I got a new Cadillac, let's go on a plant tour," and he said, "When do you want to leave?" I told him I had some things to put together so I said two weeks and he said, "Alright, I'll come there and we'll go east." And so we did! We went to Pennsylvania and there were a couple big precast plants out there. We'd go in and I'd introduce Joe and tell them who I was. Nobody had heard of me, but boy, they had heard of Joe.

We went out to a plant that was on a farm and there were some slats for cattle and hogs. We could see they were made on a machine, so we stopped and Joe said, "I know this guy." We went in and started talking to him and asked him what kind of machine he had to make those slats. Joe was always into that. He told us he bought one used and finally he said, "Do you want to see it?" Joe said, "Yeah." The farmer took us out in his building and we walked in there and Joe said, "I wondered what happened to this machine, I used to own it." Joe has a great personality and can strike up a conversation with anyone. He's the ideal person to travel with. We went to 20-some plants and we learned a lot.

Linda and I have enjoyed being involved with the association since the very first meeting. We're thankful for the friendships we've made over the years. We have benefitted personally and professionally in many ways.

6.) How did it feel to be selected for the Yoakum Award?

It was great. It was quite an honor. I was very pleased and still am. I didn't know anything about it. I wondered why my wife had made arrangements for the grandkids to come. I don't know if I did that much for the association, but I tried.

7.) When you first got involved with NPCA, did you envision it becoming what it is today?

I never had any idea there would be so many things made out of precast and so many companies involved to help us manufacture these products. Vendors spend a lot of money at those shows bringing their hardware and I've always tried to make a point to thank them. **PI**

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Greg Chase, NPCA President, 1990

1.) Tell us what the precast industry was like when you got started.

The industry was beginning to create its niche in the construction business. NPCA was only a few years old when my father, Allen, attended his first meeting in Buffalo, N.Y. He was always trying to learn better ways to build a mousetrap and would say, "Son, you have a lot to learn. Learn it well." He knew that associating with people who shared common interests was the best route to take.

2.) Why did you get involved with NPCA and decide to become chairman?

Due to Dad's participation and the value he gained by associating with NPCA members, he encouraged me to become active as well. I attended my first convention in Pittsburgh in 1973. Even though it was my first time, I came away with new lifelong friends and a more educated understanding of precast concrete and its advantages. After staying active for a few years, I decided it was time for me to "give back" by becoming president of the association.

3.) What was the best thing you accomplished as chairman?

The best thing I accomplished was to lead a group of our members at a conference in Great Britain at the invitation of the British Precast Federation. Things were tough back home, but I felt it was important that Bobbie (my wife) and I, along with 20 or so other Americans, put on appreciative smiley faces with the English to enjoy and learn from a great precast opportunity.

4.) What's your favorite NPCA memory?

Being vice president and supporting Fred and Dee Heitman while Fred was president.

5.) How has precast as a product changed over the years?

You cannot begin to describe the changes with precast concrete products that have evolved over the years! It's amazing what precast has accomplished, especially when substituting for poured-in-place concrete. All the while it's still a fairly basic manufacturing process but with new-and-improved chemical admixtures.

Greg Chase

6.) How did the friendships formed via NPCA impact your business and life?

The friendships, their sharing of ideas and various NPCA resources developed over the years helped our business innovate and change, which led to our success. People I met 30-to-40 years ago are still among my best friends.

7.) When you first got involved with NPCA, did you envision it becoming what it is today?

It is hard to believe how much stronger the association is today. From humble beginnings mixed with a lot of dedication and hard work from a lot of people, it has become very successful over the years. Congratulations to all who helped make it happen! **PI**

NPCA file photo

CONFINED SPACES

Protecting Against the Dangers

By Evan Gurley

Confined space signs remind employees of the proper procedures and precautions to take before entering.

The Occupational Safety and Health Association cited a California company in 2013 after a 40-year-old worker was killed while inside a concrete mixer chipping away buildup. The company received citations for failing to identify the hazards of working within the confined space and failing to train its workers about confined space hazards. The six serious violations and one general violation with penalties totaled $50,400. This is just one account of an accident that could have been avoided with proper hazard identification and adequate training. According to OSHA, that wasn't the only confined space fatality in 2013. OSHA estimates that about 90 deaths involving confined spaces occur every year.

CONFINED SPACE SAFETY: WHAT YOU NEED TO KNOW

Many precast workplaces contain spaces that are considered to be confined because the configurations hinder the activities of employees who work in them. In many instances, employees who work in confined spaces also face increased risk of entrapment, engulfment and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards and may keep employees closer to hazards – such as machinery components – than they would be otherwise.

As outlined in OSHA 29 CFR 1910.146, a confined space is:

- Large enough for an employee to enter fully and perform assigned work.
- Not designed for continuous occupancy by the employee.

- Limited or restricted with regards to entry or exit.

Confined spaces at precast plants may include vaults, tanks, storage bins, pits, cement/fly ash silos, storage vessels and other similar areas. The terms "permit-required confined space" and "permit space" refer to spaces that meet OSHA's definition of a confined space and contain additional health or safety hazards. For this reason, OSHA requires workers to have a permit to enter these spaces.

A permit-required confined space also contains one or more of the following characteristics:

- Potential to contain a hazardous atmosphere.
- Potential to engulf someone who enters the space.
- An internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.
- Other serious physical hazards such as unguarded machines or exposed live wires.
- Other recognized serious safety or health hazards.
- Is immediately dangerous to life or health.

This means that if the space has either real or potentially hazardous atmospheres (e.g. oxygen deficiency, oxygen enrichment, presence of toxic vapors/fumes, presence of explosive vapors/fumes), presents engulfment by material or contains physical hazards (e.g. unguarded moving machinery, narrowing passages, excessive heat, excessive noise or other hazards that pose a serious threat), there must be additional safety steps taken to ensure the safety of anybody accessing that space.

Safety precautions you should consider with permit-required confined spaces:

- Do not enter without being trained and without having a permit.
- Review, understand and follow the precaster's procedures before entering and exiting.
- Before entry, identify any physical hazards.
- Before and during entry, test and monitor for oxygen content, flammability, toxicity or explosive hazards as necessary.
- Use fall protection, rescue, air monitoring, ventilation, lighting and communications equipment according to entry procedures.
- Maintain contact at all times with a trained attendant either visually, via phone or by two-way radio. This monitoring system enables the attendant and entry supervisor to order you to evacuate and to alert appropriately trained rescue personnel to rescue entrants when needed.

WHAT PRECASTERS NEED TO DO TO COMPLY

OSHA 29 CFR 1910.146 contains best practices and procedures to protect employees in the precast industry from the hazards of entering permit-required confined spaces.

Precasters must evaluate all workplaces to determine if spaces are classified as confined spaces and/or permit-required confined spaces. If a workplace contains permit spaces, the precaster must inform exposed employees of its

ADDITIONAL SAFETY TIPS FOR CONFINED SPACES

- All entrants, supervisors and entry attendants must be fully qualified and trained.
- Do not enter a confined space if not authorized.
- All confined spaces should be treated the same at the beginning.
- Assumptions can be and are often fatal.
- No gas cylinders should be contained in a confined space.
- Assume that the most unfavorable situation exists in every case until proven otherwise.
- Spaces may need extensive precleaning and recleaning.
- If involved in confined-space operations, follow all provisions of the company's written confined space program.
- Open all manholes for ventilation.

existence, location and the hazards it poses. This can be done by posting danger signs such as "Danger: Permit-Required Confined Space – Authorized Entrants Only." If employees should not enter and work in permit spaces, precasters must take effective measures to prevent them from entering. The precaster must develop a written permit-confined space program and make it available to employees or representatives.

Under certain conditions described in the standard, the precaster may use alternative procedures. For example, if a precaster demonstrates with a monitoring device and inspection data that the only hazard is an actual or potentially hazardous atmosphere that can be removed using continuous forced air ventilation, the precaster may be exempted from some requirements such as permits and attendants. Additional considerations include:

- **Written programs.** Any precaster who allows employee entry into a permit space must develop and implement a written program for the space.
- **Controlling hazards.** A precaster's written program should establish the means, procedures and practices to eliminate or control hazards necessary for safe permit space entry operations.
- **Equipment for safe entry.** In addition to personal protective equipment, other equipment that employees may require for safe entry includes the following: testing, monitoring, ventilating, communications and lighting equipment, barriers and shields, ladders and retrieval devices.
- **Detection of hazardous conditions.** If hazardous conditions are detected during entry, employees must immediately leave the space. The precaster must evaluate the space to determine the cause of the hazardous atmosphere and modify the program as necessary.
- **Entry permits.** A permit, signed by the entry supervisor, must be posted at all entrances or otherwise made available to entrants before they enter a permit space. The permit must verify that pre-entry preparations outlined in the standard have been completed. The duration of entry permits must not exceed the time required to complete an assignment.
- **Cancel entry permits.** The entry supervisor must cancel entry permits when an assignment is completed or when new conditions exist. New conditions must be noted on the canceled permit and used in revising the permit space program. The standard requires that the employer keep all canceled entry permits for at least one year.
- **Worker training.** The precaster must provide proper training for all workers who are required to work in permit spaces. After the training, the precaster must ensure that the employees have acquired the understanding, knowledge and skills necessary to safely perform their duties. Additional training is required when job duties change, a change occurs in the permit space program or the permit space operation presents a new hazard and an employee's job performance shows deficiencies.
- **Assign duties and emergency procedures.** Personnel duties and emergency procedures should be established and assigned to ensure everyone knows their role and the proper procedures required in case of an emergency.

OSHA UPDATE: FINAL RULE ISSUED INCLUDES CONSTRUCTION WORKERS

In May, OSHA published a final rule to increase protections for construction workers in confined spaces. In August, the standard went into effect. The new subpart replaces OSHA's one training requirement for confined-space work with a comprehensive standard that includes a permit program designed to protect employees from exposure to many hazards associated with work in confined spaces, including atmospheric and physical hazards. The final rule is similar in content and organization to the general industry confined space standard, but also incorporates several provisions for the proposed rule to address construction-specific hazards, account for advancements in technology and improve enforceability of the requirements.

OSHA last issued rules addressing work in confined spaces in 1993; however, those provisions applied only to general industry work. A single training provision, issued in 1979, applies to confined space work in construction. 29 CFR 1926.21(b)(6) provided limited guidance, instructing employers to train employees as to the nature of the hazards involved, necessary precautions to be taken and use of protective emergency equipment.

Manholes, crawl spaces, tanks and other confined spaces are not intended for continuous occupancy. People working in confined spaces face life-threatening hazards including toxic substances, electrocutions, explosions and asphyxiation. In 2014, two workers were asphyxiated while repairing leaks in a manhole, the second when he went down to save the first, which is not uncommon in cases of asphyxiation in confined spaces.

"In the construction industry, entering confined spaces is often necessary, but fatalities like these don't have to happen," said Secretary of Labor Thomas E. Perez. "This new rule will significantly improve the safety of construction workers who enter confined spaces. In fact, we estimate that it will prevent about 780 serious injuries every year."

The rule will provide construction workers with protections similar to those who work in manufacturing and general industries, with some differences. These include requirements for: identifying confined spaces and the hazards they may contain, allowing employers to organize the work to avoid entry into a potentially hazardous space, removing hazards prior to entry to avoid employee exposure, restricting entry through a permit system where employers cannot remove the hazard, providing appropriate testing and equipment when entry is required and arranging for rescue services to remove entrants from a confined space when necessary.

The final rule affects establishments in several sectors of the construction industry, including work involving buildings, highways, bridges, tunnels, utility lines and other types of projects. Also potentially affected are general contractors, specialty-trade construction contractors and employers engaged in some types of residential construction work. **PI**

Evan Gurley is a technical services engineer with NPCA.

CONTROLLING MOISTURE to Ensure Quality

Too much water in the concrete mix: What's the big deal?

When it comes to quality precast manufacturing, water and moisture probes are definitely **a big deal**.

By Phillip Cutler, P.E.

Photo Credit: Advanced Concrete Technologies

Moisture probes can be inspected for damage and buildup when positioned in the floor of a countercurrent planetary mixer.

Excessive water can destroy a concrete mix design. Discovering the detrimental effects can be easily seen in a small-scale experiment using compressive-strength cylinders and a common mix design.

For one cylinder, increase the amount of mix water and keep all other parameters the same. Then, take the pair of cylinders and break them. With all other factors controlled, you'll easily see your concrete strength reduces with increasing amounts of water. If you prefer to believe industry resources, simply view Figure 12-3 from the Portland Cement Association manual "Design and Control of Concrete Mixtures, 15th Edition." The figure clearly illustrates that as the quantity of mix water increases (or water-cement ratio increases), concrete strength decreases. The general rule is "an extra gallon of water per yard reduces the compressive strength of your concrete mix by approximately 500 psi." You wouldn't expect anyone to dump a gallon into a mixer, but the tricky thing about water is that it can hide. Excess moisture in fine aggregates can easily account for a gallon of water.

So the real question is: Do you use moisture probes or nationally recognized ASTM manual test methods for determining moisture? We could make strong cases for both methods. However, with either choice, accurate accounting of moisture in aggregates is essential to keep your mix on target and within specified limits.

One extra gallon of water per yard reduces the **compressive strength** of your concrete mix by approximately **500 psi**.

AGGREGATE MOISTURE DETERMINATION BY TESTING

ASTM C70, "Standard Test Method for Surface Moisture in Fine Aggregate" and ASTM C566, "Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying" are the two manual methods used by plants to measure aggregate moisture content. These tests are typically performed daily by the quality control technician and may occur more than once per day depending on aggregate consumption, the prevailing weather conditions, whether or not bins are exposed to the elements and project-specific requirements.

The plant's technician pulls the appropriate sample of each aggregate to be tested, usually prior to the first batch of concrete made each day, and performs the tests according to the detailed procedure. The ASTM C70 evaluations may be determined by mass or by volume of the sample. ASTM C566 uses the sampled aggregate mass against the same sample following drying.

Once the moisture of the aggregates has been determined, these values are typically given to the batcher for entry into the batching computer or to make the appropriate manual proportioning changes.

AGGREGATE MOISTURE DETERMINATION BY PROBES

The use of moisture probes for determining aggregate moisture has been widely used as an accepted practice in precast plants across the country for more than 25 years. There are several types of probes on the market today. These technologies allow automatic moisture evaluations of materials.

According to Robin Shepherdson, president of Scale-Tron Inc., three types of moisture probe technologies are used by precasters. Resistance-type probes measure the resistance of an electric potential between two locations. However, this measurement method is not always accurate since it depends on the impurities, or minerals, present in the water.

"For example, whether the sand has been dried and then wetted again makes a difference between measuring the body of the pile and the surface," Shepherdson said. "The measurement will show up at a higher value for that portion than the rest."

Microwave-type probes do not rely on measuring impurities, making it a better option to use, he said. They use frequency to sense

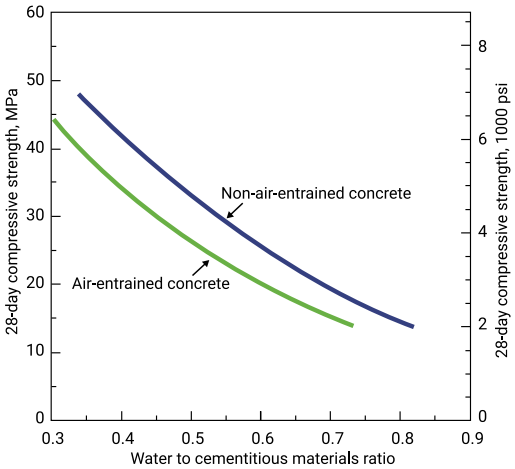

Figure 12-3 Approximate relationship between compressive strength and water-cementitious materials ratio for concrete.

To maintain a constant flow of material over the moisture probe, it can be positioned under the aggregate dosing gate.

the amount of moisture.

Lastly, radar-type probes consist of guided radar waves to facilitate measurements. The probe sends radar waves into the sand and measures the reflection returned. By measuring the reflection points, a sine wave, or data pattern, is then created to guarantee an accurate moisture reading.

Probes can be placed in bins just under the discharge gates and above the weigh belt or directly in the path of the aggregates after they have dropped onto the belt. Probes can also be placed in the mixer.

"The important thing to remember using any of these technologies is to place the probe in the aggregate flow region, the moisture reading needs to be averaged for the entire batch and you want to keep the aggregate compacted to have an even density," Shepherdson said. "Follow these three steps and you'll get accurate data every time."

Probes do not eliminate the need to perform manual tests for verification of aggregate moisture. However, they significantly reduce the frequency of manual tests. One of the biggest advantages over manual methods is they obtain values of aggregate moisture as they are batched in real time or with very minimal delay. This information is then fed directly into the automated mixing water batch controller of the plant. Automated input allows the plant to make fine adjustments to mix proportions and leads to a much narrower set of final batched concrete tolerances.

Photo Credit Advanced Concrete Technologies

Moisture probes do not eliminate the need to perform manual tests of aggregate moisture.

NPCA PLANT CERTIFICATION AGGREGATE MOISTURE REQUIREMENTS

Aggregate moisture requirements are addressed in Section 5.2.2 of the NPCA Quality Control Manual for Precast Concrete Plants. Subsection 5.2.2.1 covers conventional and dry-cast concrete and points out that aggregate surface moisture content shall be determined at least once per day in accordance with ASTM C70 or by alternate methods such as moisture meters, probes or ASTM C566. The subsection goes on to state that when aggregate bins are fitted with moisture probes or meters, aggregate surface moisture content shall be determined a minimum of once per week in order to validate probe calibration. Subsection 5.2.2.2 covers self-consolidating concrete and also requires validation of probe calibration once per week.

Moisture tests must be performed in accordance with ASTM C70 or ASTM C566.

For SCC processes made without moisture probes or meters and automatic mixing water adjustment systems, the aggregate surface moisture content must be determined at least once per day prior to the batch and once every four hours after the first batch. In addition, the language states that slump flow testing will take place for every three batches of SCC produced. This is to ensure that the moisture fluctuations of aggregates are accounted for correctly.

For additional information on moisture probes, please contact the NPCA technical services department at (800) 366-7731. **PI**

Phillip Cutler, P.E., is NPCA's director of quality assurance programs.

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Keep your employees **engaged** and **compliant** with company policies and procedures while on the job.

By Bridget McCrea

When employees fall into bad habits, cut corners or chose to ignore company policies and procedures, a few things can happen. For one, productivity drops as workers focus on activities that don't align with the company's overall goals. Safety issues also come into play – particularly at precast concrete plants, where working with heavy machinery is part of the job. Finally, multiple employees – or even the entire staff – can follow suit by taking part in the corner-cutting.

At ARTO Brick and California Pavers in Gardena, Calif., Armen Alajian, president of the 70-employee company, knows the dangers of giving employees a little too much slack. To make sure everyone is working from the same playbook every day, the company's managers hold morning prep meetings, ask questions of team members throughout the day and then close out the work day with another meeting.

"Asking questions and holding employees accountable helps keep them on their toes," said Alajian.

Alajian said the additional growth in the attention paid to worker productivity and processes has correlated to company growth. In 2008, for example, the company employed just 28 workers.

"During the economic collapse, we knew we had to grow or die," said Alajian, whose managers have added workers slowly over the last seven years. "We went from having 100 customers to having 500 national customers. To manage that growth, we had to ramp up our human resources."

With that ramp up came more responsibility for ARTO Brick's managers.

"When we were a team of 28, we all knew one another and were accountable as a team," said Alajian, who sees the daily managerial oversight as a good way to help cultivate happier, more engaged employees who feel like they belong to the team.

"The employees who are happy and engaged will be less likely to fall into bad habits in the workplace," he said. "They also make better products."

ONGOING TRAINING AND ENRICHMENT

The fact that employee engagement and productivity are top of mind for precasters like Alajian is refreshing news for Lori Bruhns, a productivity trainer and mentor in Hillsborough, N.C.

"Too many companies just let their employees sink or swim, never training them on the fine points of how to operate safely and effectively in the workplace," said Bruhns. "That not only hinders new employees' progress, but it also hurts existing employees who need regular reinforcement on rules, policies and procedures."

By combining new employees' training with regular, ongoing enrichment for existing workers, Bruhns said companies will be better able to retain workers and ensure consistently good work habits on the plant floor, in the administrative offices and out in the field. For example, a brown bag lunch meeting once a month to discuss any new regulations, policies, challenges or customer issues can be a simple way to get the team together and work toward common goals. During such meetings, managers can easily bring up problem areas to the group to avoid singling out employees and to ensure that the entire team understands the situation and is ready to do something about it.

For new employees, Bruhns tells precasters to start talking about good work habits on day one.

"Don't wait until a problem comes up and don't rely on someone's preconceived notions about good work habits to align with yours," she advises.

Hand out an up-to-date company policy and procedures manual during orientation, she suggests, and take the time to go over it page by page to ensure that there are no questions or concerns on the employee's part. Use the same materials for ongoing company training, particularly if any changes are made to the manual.

"Veteran employees can easily get into a rut and start doing things how they think they should be doing them, instead of by the book," said Bruhns. "Use your manual and the associated training to aid them in keeping a fresh perspective on the company's ideals. This not only helps ensure longevity with great employees, but it also helps retain new ones."

> "Too many companies just let their **employees sink or swim**, never training them on the fine points of how to operate **safely** and **effectively** in the workplace."
>
> – Lori Bruhns, *productivity trainer*

DON'T WAIT FOR A PROBLEM TO HAPPEN

Bruhns said companies that take the time to train new and existing employees on the value of good work habits are hard to find.

"They generally don't want to spend the money or the time to do the correct training on a continual basis," said Bruhns. "They would rather wait until there was a real problem on their hands and then address it on a case-by-case basis."

This approach can be particularly dangerous in the industrial manufacturing environment, due to the types of activities taking place on the plant floor and the associated safety issues.

Greg Roache, president at Gainey's Concrete Products in Holden, La., is well aware of the dangers of letting employees cut corners and fall into poor work habits. With 74 employees, Roache focuses strategically on the safety-related issues associated with his facilities, which at one point boasted a five-year record with no lost time or work accidents.

After the five-year streak of no lost time or work accidents ended, Roache and his team immediately started holding Monday morning meetings focused entirely on safety – both administrative/Occupational Safety and Health Association safety and practical safety such as habits, approaches, activities of employees, etc.

"We went so far as to define the attitudes of prospective

5 ways
TO ALWAYS PUT SAFETY FIRST

A Plus Benefits of Lindon, Utah, works with more than 600 different small businesses – many of which want to know how to keep employees from cutting corners. According to Samantha Reynolds, the firm's communications coordinator, **safety is one area where companies seem to need the most help**. Here, she shares her five-step process for keeping employees from falling into bad habits on the job.

1. **Make safety training part of your onboarding process.** Focusing on safety right from the start shows your new employees that it is an important part of your company culture.

2. **Commit to regular safety discussions.** Weekly or daily safety meetings have been shown to dramatically reduce injuries. "This commitment to regular safety meetings demonstrates to your employees that you are committed to their safety and gives you an opportunity to hold them accountable for their behavior," Reynolds said.

3. **Put together an employee safety committee.** Often the safest way to do something is also the most profitable. This open door environment will not only bring new ideas to the table for safety, but other areas of the business as well. Asking for employee ideas has also been shown to improve employee engagement and job satisfaction.

4. **Invest in appropriate safety equipment.** Having up-to-date safety equipment for your employees once again demonstrates the company leaders' commitment to the safety program. It shows that you are not comfortable with cutting corners to save a few dollars. This makes your employees more comfortable spending the time and effort to do things the safest way.

5. **Make safety a part of your regular business discussions.** Think about the impact business decisions will have on safety. Consider how company safety impacts your organization's goals and share that with your employees.

employees," said Roache, "knowing that the person who got a speeding ticket for going 70 mph in a 30 mph zone could be a sign of a potential safety problem."

Monday meetings often focused on simple safety topics and demonstrations such as how to effectively prevent cement burns by using gloves and barrier creams. Managers also use handouts to reinforce the meeting topics and field questions. In addition, the nine managers at Gainey's get together once a week to discuss all of the current issues that are impacting the company, including employee disciplinary write-ups, safety issues and other important topics.

Gainey's also uses departmental Job Safety Analysis reports that are submitted to the company's safety manager each day. In post-production, for example, the company would use a JSA to introduce a new process that incorporates cold-tar epoxy. The document, signed by employees, would detail safety procedures. The frontline manager would go over the JSA and then workers sign off on it at the end of the day if no safety issues or injuries occurred.

"If they sign off on the JSA and said there were no injuries that day then someone can't go home, hurt themselves, and come back and say that it happened in post-production the day before," Roache said. "It's just an added layer of protection for us and for our employees."

"Individuals who are managing others **must understand** the company's **expectations, story, culture** and **mission**."

– Teresa Lensch, *BusinessTrainingKits.com*

ADDRESSING THE LABOR ISSUE

As quality labor becomes more and more difficult to find in today's recovering economic climate, Roache said precasters will have to find ways to keep their new and veteran workers engaged, on task and doing the right thing.

"We have a quality of labor problem in this country, and sometimes I feel like we shoot ourselves in the foot with our strict attendance policies," said Roache. "Not only are we expecting people to work in hot and dirty environments, but we also want them to be drug-free and able to operate safely in our workplace. The pool of people who qualify for that is getting pretty small."

To offset some of those challenges, Roache said having a full-time safety officer on board, instituting a regular meeting schedule and holding employees accountable to the company's policies, procedures and guidelines through the use of tools like JSAs are all good strategies.

"Keeping your safety record where it needs to be is far less expensive than paying for your worker's comp when your safety rating isn't where it should be," said Roache, who advises companies to reach out to fellow NPCA members for help and support in this area. "Use your network."

READY, SET, GO!

Along with training, employee accountability measures and JSAs, Teresa Lensch, CEO at BusinessTrainingKits.com in Dallas, said simply setting expectations with frontline leaders can go a long way in helping to ensure good habits go far in today's workplace.

"Individuals who are managing others must understand the company's expectations, story, culture and mission," Lensch points out. "This may seem like an obvious thing, but having a sheet available that outlines all of the firm's key values and expectations as far as behaviors go can really help in this area."

When it comes to correcting bad habits, Lensch said that sometimes these are tolerated based on a worker's tenure with the company, relationship to its

ownership/leadership (particularly in a family-owned firm) or other situation that may not be easily reversed.

"If this is happening in your company, you'll want to address it right away," Lensch advises, "because new employees may pick up those bad habits if they see that those activities are being tolerated by managers and leaders."

Ultimately, Lensch said company owners, leaders and managers shouldn't be afraid to intervene when they see certain behaviors that go against the grain or that clearly violate company policies and procedures.

"Address it right away and in a very positive and reinforcing way," said Lensch. "Don't wait six months. Embed it in your daily conversations with employees and you'll have a much better chance of making the desired habits the 'norm.'"

PRACTICE MAKES PERFECT

Management is hard work and requires consistent efforts to improve not only the performance of the employees but also the manager. Implementing policies and procedures that are strictly adhered to will help managers and employees consistently perform better. These, in combination with a company culture that strives for improvement and regular face-to-face interaction, will go a long way in ensuring a safe, productive and enjoyable workplace. **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.

MATERIAL MATTERS: Accelerators

Accelerators are added to concrete to increase the rate of early strength gain and to reduce initial and final set times.

By NPCA Staff and Debbie Sniderman

EDITOR'S NOTE:
This is the last article in a four-part series on materials that enhance the performance of concrete. This segment covers accelerators.

Photo Credit: Euclid Chemical

Accelerators can help precasters turn forms faster.

Cement hydration is temperature and time dependent. The higher the temperature, the faster the reaction happens. As time passes, strength continues to develop, even beyond initial set, as the hydration reactions continue. Accelerators act as a catalyst for hydration reactions.

ACCELERATOR BASICS

The main reason to use accelerators is to achieve early strength gain and early setting. As soon as water comes in contact with cementitious materials, hydration reactions begin. Likewise, most accelerators also begin performing shortly upon their addition to a concrete mix.

Accelerators have a greater impact in colder temperatures.

During the dormant period when the fresh concrete is plastic and able to be handled, prior to initial set, the action of set accelerators can last anywhere from 10 minutes in a hot mix to 2 hours for a cold mix. During the setting period, after initial set but prior to final set, accelerators can provide rapid strengthening for up to 10-12 hours, especially if heat is applied. Lastly, during the hardening period, strength gain is typically very slow and can take many hours to complete. In some cases, however, flash set, or rapid stiffening accompanied by excessive heat generation, can occur due to an insufficient amount of gypsum in the cement. False set, which involves rapid setting and very little heat generation, could also occur.

"Usually, accelerators are a blend of **organic** and **inorganic** materials. Each raw material has a different **reaction time**. One may not do anything for 30-60 minutes and another will."

– Ketan Sompura, *Sika*

Typically, accelerators are custom blends of chemicals that do exactly what the precaster wants with the specific cement used. Some have accelerating and water-reducing properties (ASTM C494 Type E chemical admixtures), while some are only accelerators (ASTM C494 Type C chemical admixtures). Some even help improve concrete's workability while others can help increase corrosion resistance. One way that manufacturers classify accelerators is based on the materials from which they are produced. Ketan Sompura, director of concrete technology and admixture and fiber products manager at Sika, said there are four types of accelerators; soluble inorganic salts, soluble organic compounds, quick-setting admixtures and miscellaneous solid materials. Admixture companies may combine several raw materials from all of these categories.

There are several soluble inorganic salts used for accelerators. The most effective is calcium chloride. Chlorides are the most economical accelerators and perform well. Chlorides, however, promote corrosion of steel, so they aren't used in steel-reinforced concrete. Other inorganic salts contain nitrates, nitrites and thiocyanates instead of chlorides. These accelerators are slightly more expensive and can be used with steel reinforcement. Soluble organic accelerators use triethanolamines and calcium. Quick-


Photo Credit Euclid Chemical

Combinations of different accelerators can be used. Tests should be conducted to determine which combinations work best with the materials being used.

setting accelerators aren't typically used in precast or ready-mix applications because they cause such a rapid loss of plasticity and workability. Other accelerators may use compounds such as silicates and carbonates.

"Usually, accelerators are a blend of organic and inorganic materials," said Sompura. "Each raw material has a different reaction time. One may not do anything for 30-60 minutes and another will.

"Manufacturers combine them in different ratios and tailor the start and stop times before they react and provide results so they are suitable for precast applications."

HOW ACCELERATORS WORK IN CONCRETE

Set accelerators work by acting as a catalyst for hydration reactions. The products of hydration reactions continuously accumulate, and the reactions continue until either all of the cement or all of the water in the mix has been exhausted. However, the products of hydration reactions can also surround unhydrated cement particles and create a barrier for the unreacted cement to come in contact with water. Chloride- and salt-based accelerators weaken the barrier created by these products and allow certain compounds in cement to hydrate, speeding up the hydration process. Accelerators containing triethanolamines act on a different compound in the cement and increase the rate at which the reactions occur with that compound. Triethanolamines can also encourage ettringite formation.

"The majority of accelerators react with tricalcium silicate, the major component of cement," Sompura said. "Usually accelerators don't work with dicalcium silicate, and only some of the accelerators work with tricalcium aluminate to make them be very quick setting."

WHAT'S IMPORTANT ABOUT ACCELERATORS

Although all accelerators start out as powders, most

are supplied in liquid form because it is easier to dispense and evenly integrate into the concrete. Admixture suppliers provide bagged, dry forms to smaller precasters who don't use high volumes, don't have liquid dispensers and metering systems, are in remote locations or don't receive weekly deliveries. Some accelerators, however, must be shipped in liquid form because they would be too dangerous as powders.

Liquids are easy to dispense and a homogenous mix is attained easier with liquids than with powdered additives. Sompura said there are two ways to integrate liquid accelerators into fresh concrete. One uses an automatic dispensing system which directly feeds accelerators into concrete mixtures. This metered batch process that takes liquid from a bulk tank to the mixer is usually used with large volumes of chemical admixtures. For lower volumes, a dispensing tube and a glass dispensing bottle provide visual confirmation for the person in charge of batching.

Admixtures are dosed by weight of the cement in the batch. The dosage of chloride accelerators typically follows the industry standard of 1-to-2% of the cement weight. Non-chloride accelerators have more variable dosages. Each accelerating admixture has a manufacturer-recommended dosing rate on its product data sheet. Sompura said these recommended dosages are guidelines and starting points for precasters to determine how much of the product to add. Most precasters create trial mixes and test a few doses to see which gives their product the required strength while also exhibiting a desirable level of workability and maintaining plasticity long enough to place the concrete and finish the exposed surfaces.

Accelerators are used more frequently in low ambient temperatures because the hydration reactions occur at a slower rate in colder temperatures. Accelerators also have a greater impact in colder temperatures. The warmer the ambient temperature, the less effective the accelerator. Using 2% accelerator by weight of cement at 45 degrees Fahrenheit may provide 5 hours of acceleration, but at 70 degrees Fahrenheit, the same amount of the same admixture may only provide 2-3 hours of acceleration. The accelerators-decreased effectiveness at higher temperatures is a nonissue since the hydration reactions occur at a faster rate at warmer temperatures – making accelerators unnecessary except for special circumstances.

Accelerators can also pose challenges for precasters, such as long-term strength gain and shrinkage. These are easily dealt with as long as the precaster is aware of the challenge and the solution.

"The majority of **accelerators** react with **tricalcium silicate**, the major component of cement."

– Ketan Sompura, *Sika*

"Although accelerators provide **higher early strength**, many people don't realize that they **lower the ultimate strength.**"

– Jesse Osborne, *Euclid Chemical*

"Although accelerators provide higher early strength, many people don't realize that they lower the ultimate strength," said Jesse Osborne, precast segment and admixture manager at Euclid Chemical. "Most precasters accept this and over-design a little bit, adding 5-to-10% more cement to reach the specified strength."

Osborne said many admixture producers also include components that help offset shrinkage, which is a concern for precasters. Expansive agents and surface tension-reducing components can be included in accelerators. ASTM C494 dictates the maximum allowable amount of shrinkage and water reduction caused by the use of accelerating admixtures.

Sompura said accelerators affect the set time, but don't necessarily affect the strength. Precasters should also be aware of how much time will elapse between mixing and placing the concrete, how the concrete will be transported to the forms, ambient temperature and the mix water temperature. Some precasters use hot water to increase the rate at which the hydration reactions occur. In some cases, if approximately 30 minutes will elapse between mixing and casting, a set accelerator could make the concrete too stiff to place. Instead, an accelerator that doesn't take effect for the first half hour after mixing should be used.

Combinations of different accelerators mixed in manufacturer-specified ratios could also be used, depending on job specifications and how all the raw materials and chemicals interact. It is important to test different products in test batches to determine which combinations work best with the materials being used.

HOW ACCELERATORS ADVANCE PRECASTERS' WORK IN THE PLANT

According to Mark Celebuski, partner at Trinic, a manufacturer supplying powdered accelerating admixtures, precasters often use accelerators to offset the delaying effects of other additives. Some common additives like water-reducing admixtures or supplementary cementitious materials can decelerate the set of concrete. Using accelerators helps hydration occur at an elevated rate and increases the rate of set and strength gain. Precasters can also use accelerators to turn forms faster, which translates into greater efficiency and a reduction in total days and labor costs for production. **PI**

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

Photo Credit Wisconsin Department of Transportation

A NEW PARADIGM

Precast Bridge Elements in Accelerated Bridge Construction

Precast concrete's role in ABC takes a **big step forward.**

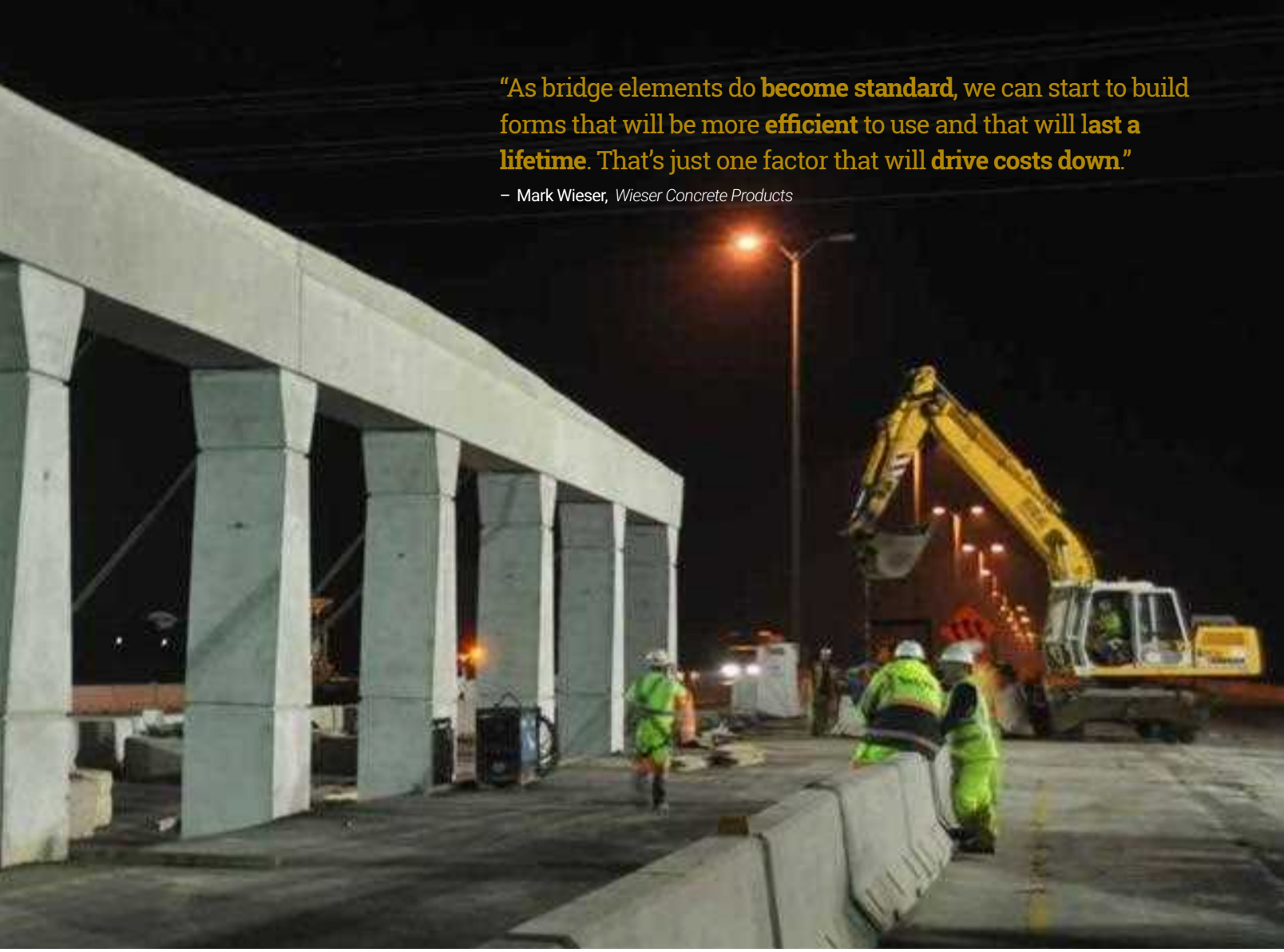
By Angus W. Stocking, L.S.

For years, accelerated bridge construction has enabled DOTs to accomplish more in less time and for less money. Now, some DOTs feel that the experiemental phase of precast concrete use in ABC is coming to an end. Lessons have been learned and it's time to apply those lessons more routinely on more projects.

PILOT PHASE COMPLETE

"The current state of accelerated bridge construction, and particularly precast bridge elements, is that a lot of pilot projects have been completed by owner agencies, mostly due to programs developed by the FHWA," said Bill Oliva, P.E., chief of structures development for the Wisconsin Department of Transportation's Bureau of Structures. "And a lot of these projects have been custom, experimental, or stand-alone – with all the extra costs that implies. Now, we've learned a lot and have established that this is not a passing thing – the use of precast elements in bridge construction is a new paradigm."

Specifically, Oliva said WisDOT is able to simplify and standardize the types of elements needed in bridge



"As bridge elements do **become standard**, we can start to build forms that will be more **efficient** to use and that will **last a lifetime**. That's just one factor that will **drive costs down**."

– Mark Wieser, *Wieser Concrete Products*

construction and is reaching out to contractors and the precast industry to share what's been learned.

"That should raise the comfort level in the industry and encourage longer-term investments in reusable forms and other equipment and techniques," Oliva said. "Ultimately, there's no reason precast bridge elements can't achieve cost parity with other bridge construction methods."

Oliva hopes that agencies and contractors will work together to create simpler, broader standards for precast bridge components. Then, contractors and precast plants will make investments and workflow adjustments that take advantage of the standardization. The costs and timelines of bridge construction will both be reduced as a result.

Wieser Concrete Products is one of several Wisconsin plants now certified to produce precast components for WisDOT. Certification means that components manufactured by Wieser, like vaults and catch basins, don't require individual inspection during casting. Executive Vice President Mark Wieser agrees with Oliva.

"Without standardization, the use of precast requires earlier involvement of precast subcontractors during the design phase and that obviously adds expense," Wieser said. "As bridge elements do become standard, we can start to build forms that will be more efficient to use and that will last a lifetime. That's just one factor that will drive costs down."

Much of the experimentation in ABC, at WisDOT and nationwide, has been encouraged and partially funded by the Transportation Research Board's second Strategic Highway Research Program, which was created to find strategic solutions to three national transportation challenges: improving highway safety, reducing congestion, and improving methods for renewing roads and bridges.

"With each project we've undertaken, we've debriefed project staff from designers to fabricators and contractors to see what can be better," Oliva said. "And we'll also show up at stakeholder conferences like the Wisconsin Transportation Builder Association and the American Council of Engineering Companies to show what we've been doing. We talk about what we've learned and how we want to go forward."

WisDOT incorporated precast concrete pier caps to replace the Rawson Avenue Bridge at I-94. WisDOT calls the precast products its first generation.

The SHRP was put to good use in Wisconsin. On just one ongoing project, Interstate 39/90 between Dane County and Illinois, four SHRP bridge projects have already been completed and one more will be completed in 2016. Much was learned, including a measure of precast's potential in ABC.

Photo Credit Wisconsin Department of Transportation

"Here in Wisconsin, just having a way to **accelerate schedules** to beat the onset of winter and have **full operation before snow falls** will be something we use **all the time.**"

– Bill Oliva, P.E., *Wisconsin Department of Transportation's Bureau of Structures*

"There's a total of 62 bridges on this project, and at least 50 of them are suitable for the use of precast," Oliva said. "In fact, contractors are able to implement precast now if that's what's they feel is appropriate, and I expect many to take advantage of that option."

STANDARDIZATION, SIMPLIFICATION AND INTERCHANGEABILITY

To increase use of precast bridge elements and bring down costs, WisDOT has identified key concepts that work together: standardization, simplification and interchangeability.

"With our precast elements, what we've chosen to do is to make them simpler and to standardize them," Oliva said. "The goal is to make them interchangeable with cast-in-place elements. If we can do that well, agencies and owners will be able to switch from one to another at any point in the project, from design to construction."

DOTs are starting to see the benefits of using precast elements in ABC.

As precast components become simpler, more standardized

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"I think it's inevitable that **costs will come down** and achieve parity with cast-in-place ... Concrete and precast is not right for every situation, but **it will become predominant**. I believe it will be the **default**."

– Bill Oliva, P.E., *Wisconsin Department of Transportation's Bureau of Structures*

and interchangeable with cast-in-place, tremendous flexibility will be introduced for agencies and contractors. For example, if the construction timeline is threatened by inclement weather, the contractor will have the option of replacing cast-in-place elements with precast elements, without redesign and without change orders.

"It will require notification, and our concurrence, of course," Oliva points out. "But why wouldn't we do that?"

Likewise, if WisDOT finds that lane closures are having unexpected effects on congestion and traffic, they'll have the option of imposing precast use mid-project, to shorten construction time. Oliva sees this as a tool for managing construction risk.

"I spent a decade as a project development supervisor, and it was clear to me that we needed something like this," Oliva said. "When dealing with unexpected issues that affect schedule, safety and traffic control, an option like this has tremendous utility. There are many cases where interchangeability will make a difference.

"Here in Wisconsin, just having a way to accelerate schedules to beat the onset of winter and have full operation before snow falls will be something we use all the time."

NATIONAL APPEAL

Wieser doesn't think that ideas like this will be limited to use in Wisconsin.

"As a rule, WisDOT is very good at working with contractors and suppliers, so it makes sense that the use of precast bridge elements is off to a good start here," Wieser said. "But as other DOTs see the durability and ease of use, they'll adopt these methods as well. It's a new concept, but everyone values speed and keeping roads open."

Oliva agrees. "Right now, most states are developing their own standards for ABC and precast," he said. "But the FHWA has produced good guidelines and detailed documents too, and I think that we will start to see some national standards develop. It would be nice if that happens, and good for contractors."

For example, if Illinois plants could confidently develop forms for elements used there and in Wisconsin, that would bring costs down for projects in southern Wisconsin, he said.


Photo Credit: Wisconsin Department of Transportation

Tom Heraty, vice president of sales and engineering at Utility Concrete Products in Morris, Ill., said precast concrete in ABC is progressing in Illinois due to state officials embracing innovative ideas. For this reason, Illinois Department of Transportation consultants and contractors contacted the company to learn more about precast concrete products. The relationship formed with IDOT led to Utility Concrete receiving a call to manufacture precast bridge approach slabs for an Illinois Tollway ABC project, a product that had always been cast-in-place in Illinois. He said for precasters that are already manufacturing modular products and are interested in manufacturing ABC precast products, the best place to start is to contact state officials and decision makers directly.

"We got involved by having a good reputation and either talking to IDOT consultants or getting involved with trade groups," Heraty said. "We also prepare ourselves by reading publications to be aware of the latest technologies available."

He said most transportation agencies, like IDOT, are choosing precast concrete in construction designs since they are seeing not only the cost savings as a result, but safety and traffic savings as well.

ALWAYS AN OPTION

When asked if there are bridge projects where the use of precast elements will not be appropriate, Oliva said, "There may be some, but I can't think of any off the top of my head. We've done the research now, and it suggests that if we successfully create common standards, and work with the industry, we'll start seeing routine, cost-effective use of precast."

Oliva does think there will be a clear progression in implementation of standard elements; first substructure bridge pieces, then abutments, then possibly deck panels. Precast may even have a role in bridge repair and rehabilitation. WisDOT is currently looking at substructure elements and precast deck panels as a possibility for future projects.

"We've done some work with deck panels in the past, and there are factors to address, but I think we'll get there," he said.

THE MATERIAL OF CHOICE

WisDOT used precast bridge pier caps for the I-39/90 Corridor project.

It's an exciting time for agencies and contractors. ABC with precast elements, once considered a new – albeit promising – technology appears to have matured and is on the verge of general acceptance. Many successful pilot projects have been completed, the concept has been proven effective and broad standards are emerging. The effect on ABC is likely to be profound.

"I think it's inevitable that costs will come down and achieve parity with cast-in-place," Oliva said. "Or even better than that, precast concrete girders are much cheaper than steel girders now, and there's no reason the same market forces won't have the same effect on other bridge components. Concrete and precast is not right for every situation, but it will become predominant. I believe it will be the default."

Now, as precast bridge construction becomes standardized and more flexible, actually reducing construction risks, it seems likely that agencies and builders will work together to drive investment and achieve massive economies of scale that drive down costs. That will make precast elements in ABC faster, better and more cost-efficient. And when that happens, the world changes. **PI**

Angus W. Stocking, L.S,. is a licensed land surveyor who has been writing about infrastructure since 2002.

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Photo Credit Chicago Department of Transportation

Walk This Way

Precast concrete products play a significant role in constructing Chicago's downtown riverwalk.

By Mason Nichols

The history of Chicago is intertwined with the waterway that runs directly through it. Settlers in the area relied heavily on the Chicago River for the burgeoning lumber and meatpacking industries in the 19th century. Along with industrialization came increased use of the river for trade, resulting in Chicago becoming the fastest growing city in the world for several decades.

Today, Chicago is as busy as ever with nearly 3 million residents and continues to be a central hub for business and leisure. While use of the river for commercial purposes has declined, increased attention has been given to its aesthetics and recreational potential. The Chicago Riverwalk project aims to capitalize on the river's beauty and central location with the construction of a 1.25-mile promenade connecting Lake Michigan with the heart of the city.

To make the new riverwalk possible, project owners turned to precast concrete.

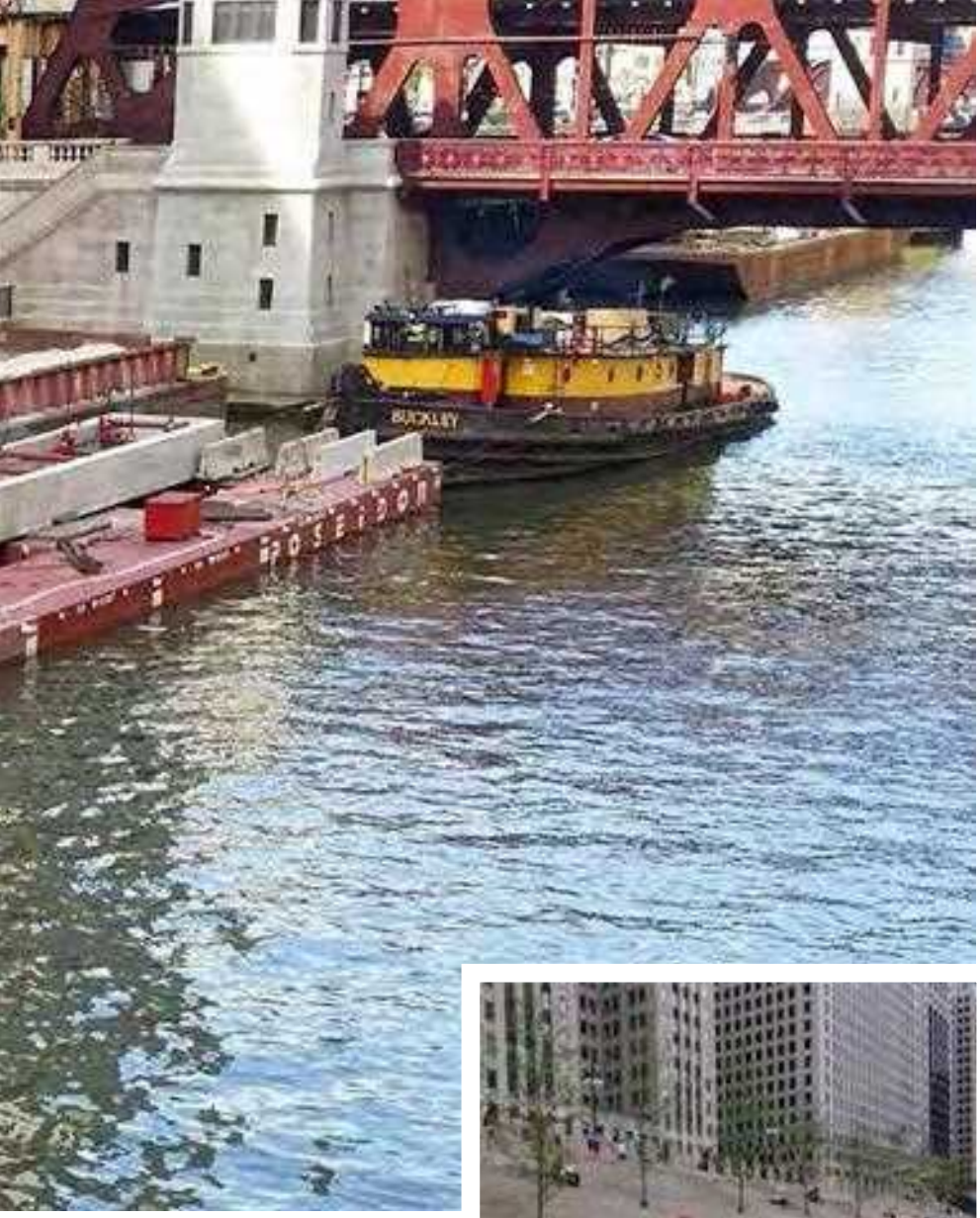

Photo Credit: Chicago Department of Transportation

The Chicago Riverwalk allows residents and visitors to walk along the river without having to go up to the street level, reducing pedestrian traffic.

BUILDING LAND ON WATER

According to Dan Gross, P.E., resident engineer for the project and senior vice president for Alfred Benesch & Co., constructing the riverwalk is similar to building a pier. Crews first drilled a series of caissons to support the underbridge structures on which the walkway would be built. Illini Precast of Westchester, Ill., then manufactured nine precast concrete "tubs" – varying from 45-to-84 feet in length and measuring 10 feet wide by 4 feet high – to function as the main component of the underbridges. Workers also had to widen the existing abutments 20 feet to accommodate the riverwalk.

"This is unique for us in that we're basically creating land where there was none," said Oswaldo Chaves, engineer with the Chicago Department of Transportation.

With limited storage space for project materials and the largest precast tub weighing 175,000 pounds, a unique solution was needed to deliver the structures to the job site. CDOT collaborated closely with each party involved, including

Photo Credit Illini Precast

Illini Precast manufactured the nine precast concrete tubs which function as the main component of the Riverwalk's underbridges.

the Army Corps of Engineers, Metropolitan Water Reclamation District and the Coast Guard, to ensure successful transport via barge.

Crews finished erecting the underbridge structures by fitting each with rebar and pouring additional concrete, forming a solid cap. Precast concrete pavers were then placed on top of each underbridge, completing the walkway.

THE PRECAST ADVANTAGE

Before approaching the project, contractors narrowed their options for the underbridges to two materials – cast-in-place or precast concrete. According to Chaves, casting in place would have been more expensive.

"You're building everything in water, so you would have to do a cast-in-place pour and formwork in water," he said. "Given the complexity of that, doing a precast structure is more cost-efficient."

Craig Wagenbach, project manager with Illini Precast, agreed.

"Precast is a great solution for this construction

application, because casting concrete underwater is a rather expensive proposition," he said.

Cost savings wasn't the only advantage precast concrete brought to the project. The ability to manufacture the tubs in a controlled environment and ship them to the site helped crews stay on schedule.

"You manufacture the precast off site while you're working on everything else or drilling the caissons, and then, when you're ready, you just bring this right in and you're not having to form," Wagenbach said. "Forming and pouring – especially in the river – would take a longer time than just floating this in, setting it down and tying it in."

LOOKING AHEAD

When the Chicago Riverwalk project is completed in November 2016, it will provide residents and visitors alike with many benefits.

"The project offers a continuous path from the lakefront all the way to the west side, to the turning basin of the river," Chaves said. "It also allows you to walk along the river without having to go up to street level and reduces street-level traffic."

Gross added that nearby restaurants and bars should see increased business thanks to the riverwalk.

Although the river's role in crafting Chicago's history continues to evolve, one constant will remain for at least the next several decades – the durable precast concrete products that helped make its newest amenity possible. **PI**

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

GREEN CONCRETE

Cement manufacturers are hard at work searching for the **cement of tomorrow**.

By Claude Goguen, P.E., LEED AP

Solidia Technologies manufactures a cement that cures with CO_2 rather than with water to form concrete. Concrete objects made with this sustainable cement require the incorporation of water for shaping and forming only.

The term "green cement" may sound like an oxymoron to some, but it's not. Many companies are hard at work reducing the environmental footprint of cement. From startups to the world's largest cement manufacturers, it appears everyone is on the bandwagon.

Concrete is the second most used material in the world, trailing only water. According to the U.S. Geological Survey, domestic production of Portland cement increased to more than 80 million tons in 2014 and 4.5 billion tons worldwide. Most of that production is in China, which consumed more cement in the last four years than the United States has in 100 years.

ENVIRONMENTAL IMPACT

The cement industry accounts for more than 5% of global carbon dioxide emissions. The majority of these emissions are due to the decarbonation of limestone and the energy required to heat materials in a rotating kiln to temperatures exceeding 2,600 degrees Fahrenheit. According to the U.S. Department of Energy, domestic cement production

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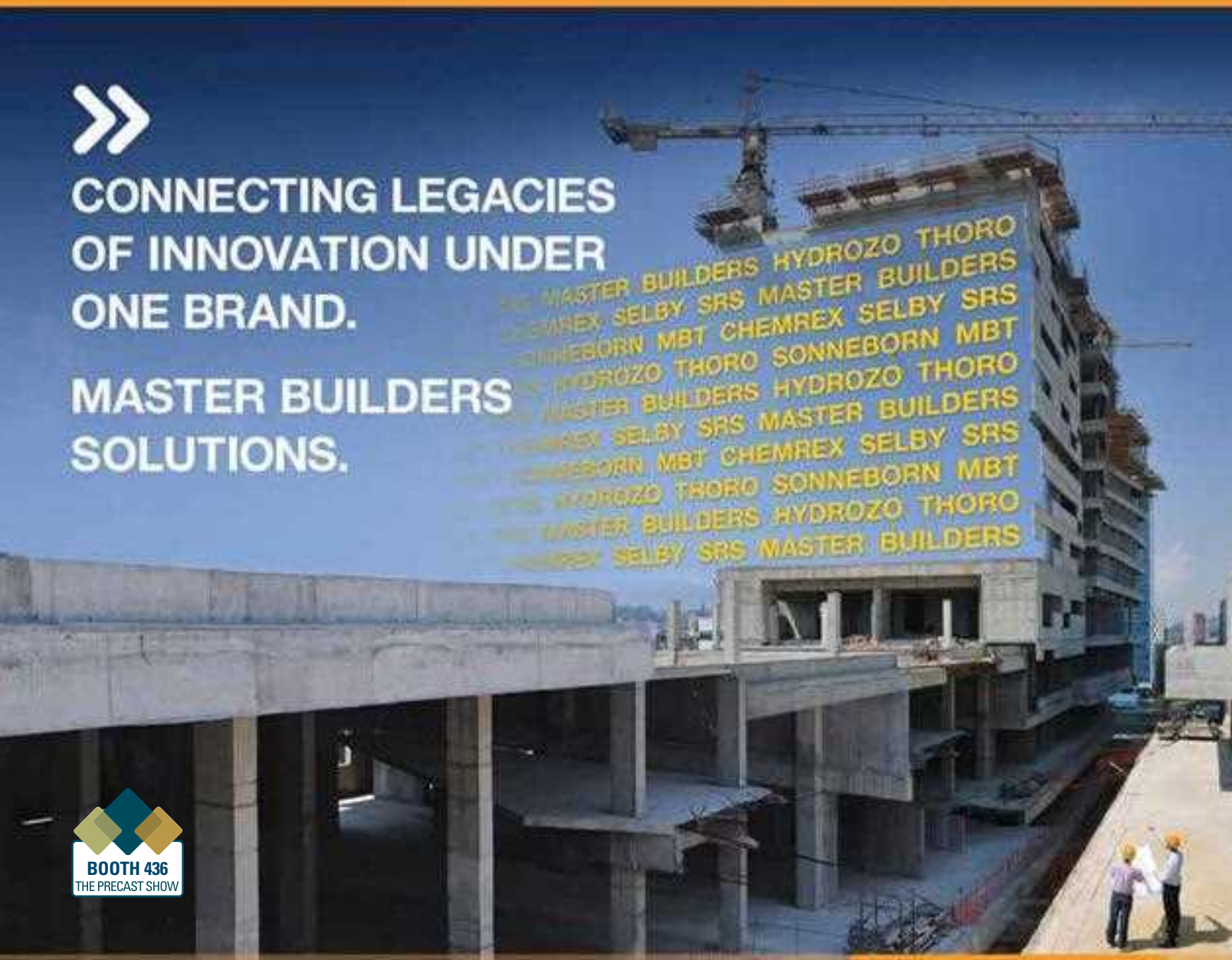

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accounts for 2.4% of energy consumption, which is lower than iron and steel mills at 11% and paper mills at 15%.

The U.S. cement industry has been focusing on continuing to manufacture a superior product while improving energy efficiency and minimizing emissions. Portland Cement Association members are committed to reducing CO_2 emissions 10% by 2020 from a 1990 baseline. The association is working to improve energy efficiency by 20% by the same deadline. Many companies have their own goals that exceed these benchmarks. Large companies have already reported they have achieved more than 20% reduction in CO_2 emissions. Manufacturers are also progressing toward these goals by employing innovative practices. Most involve improving kiln energy efficiency, using alternative fuels rather than fossil fuels and producing less-carbon-intensive cements. Some are even experimenting with capturing waste heat to generate electricity.

While producers are continuing to work on reducing environmental impacts, research is taking place to find other ways to reduce emissions. Researchers at the Massachusetts Institute of Technology Concrete Sustainability Hub have conducted a five-year study examining the molecular properties of Portland cement. The study, titled "Combinatorial Molecular Optimization of Cement Hydrates," was released in 2014. It focuses on enhancing the molecular properties of calcium silicate hydrate in order to develop a concrete with greater stiffness and strength. This could yield a more durable concrete that would reduce greenhouse gas emissions by as much as 60%. The study states that this could be achieved by reducing the ratio of calcium to silica, thus lowering the energy required to produce cement and reducing the amount of CO_2 released from limestone during the manufacturing process.

PORTLAND CEMENT ALTERNATIVES

There are many products on the market that are alternatives to OPC which are manufactured to enhance performance but reduce impact on the environment. Lower-carbon cements are an example. This technology involves reducing the amount of clinker used to produce ordinary Portland cement. Since clinker is made with limestone and produced in kilns, less clinker means less emissions and less energy. Byproducts from other industries, including slag and fly ash, are used as substitutes for clinker.

Limestone calcined clay cement is also a new product that claims to reduce CO_2 emissions by 30% versus OPC. This technology, also referred to as LC3, was developed by researchers in Switzerland. Other lower-carbon cements are being developed using magnesium silicates. The resulting material can be heated at lower temperatures than limestone.

Portland limestone cement has been used in Europe for

more than 25 years, often as an alternative to OPC in applications that do not require sulfate resistance (even though some tests have shown improved sulfate resistance for cements containing limestone). Limestone is a low-cost, readily available material that is easier to grind than clinker and leads to improved particle packing and hydration. It improves workability and reduces "bleeding" in PLC compared to OPC, but its main attributes are reduced cost and reduced CO_2 emissions. PLC containing up to 20% limestone, manufactured in accordance with current standards, can reduce energy requirements and carbon emissions by as much as 10% compared to other Portland cements.

To use another oxymoron, the topic of green cement is not really old news. Companies have been working on environmentally friendly cements for decades. New regulations

Options on the Horizon

Here are "green" cement alternatives a few companies have developed to lessen environmental impacts.

- Calera Corp. of California makes calcium carbonate from seawater or brine mixed with CO_2 that may be used as a Portland cement substitute.
- The Australia company Calix uses superheated steam to modify cement particles, making them more reactive. During this process, CO_2 can be separated and captured.
- Ceratech of Virginia has a cementitious product called Ekkomaxx. It's comprised of 95% fly ash and 5% liquid additives or activators. The company claims it has a zero-carbon footprint and enhanced durability.
- A U.S. company called Solidia Technologies developed a new binder made from similar raw materials to OPC that can be produced in a traditional rotary kiln, but at lower temperatures and through a different chemical reaction that generates less CO_2. This cement is actually mixed with water and CO_2. It reacts with the CO_2 to make calcium carbonate and silica, which then hardens to make concrete. This technology uses a patented process called reactive hydrothermal liquid-phase densification. Earlier this year, Lafarge announced a partnership with Solidia to commercialize this technology.
- Calcium sulfoaluminate cement was developed in China in the 1970s and is used as a rapid setting cement. Using this technology, it may be possible to achieve 28-day strengths in as little as 24 hours. It is used in situations where rapid setting is critical such as airport runways and bridge decks. CSA also comes with a reduced environmental impact by virtue of its required kiln temperatures of 2,250 degrees Fahrenheit as opposed to 2,600 degrees Fahrenheit for OPC. This results in a softer clinker that requires less energy to grind.
- Ferrocrete is a cementitious product invented by a scientist at the University of Arizona. It is made by blending waste byproducts from the glass and steel industry, silica and iron. CO_2 is then added to cure the product, making it a potentially carbon-negative material. The U.S. Environmental Protection Agency was so interested in the product it gave the doctoral student a grant to continue research.

are an obvious driver for research, but the cement industry has been proactive in recognizing its contribution to pollutant emissions and working to limit those emissions.

A TRUSTED MATERIAL

NPCA members are dedicated to providing sustainable construction products. Advances in cement technology are helping them deliver a material that has been trusted for thousands of years, and will likely continue to be the material of choice for thousands more.

For more information on this or any other precast concrete sustainability related topic, please visit the sustainability page on the NPCA website, or contact Claude Goguen, director of sustainability and technical education at cgoguen@precast.org. **PI**

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

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2015 Convention
Wrap-Up


NPCA file photo

Dominic Girotti (left), the 2014 Robert E. Yoakum Award winner, presented the 2015 award to Chuck Babbert, president of sales at E.C. Babbert Inc.

The NPCA 50th Annual Convention was held in Minneapolis, Minn., October 21-24, 2015. The annual business meeting brings together leaders in the precast concrete industry to network and plan the future of the association. Among the activities were meetings of the NPCA Board of Directors and product and board-appointed committees, and in-person education covering business and management, marketing and leadership. At the Annual Business Breakfast and Town Hall Meeting, new officers were elected, outgoing chairman of the board Michael Tidwell, Bartow Precast, passed the gavel to Andy Wieser, Wieser Concrete Products, to begin his one-year term, numerous awards were handed out, and members discussed the latest initiatives of the association. At the Keynote Luncheon, members were presented with Top Gun Awards and the Douglas G. Hoskin Award. Attendees also toured eight area precast plants as part of a two-day plant tour experience.

In the precast marketplace, 62 companies that supply the precast concrete industry shared their products and innovations with precast concrete manufacturers and the meeting wrapped up with a special 50th Anniversary celebration at the International Market Square honoring the people and companies who first envisioned NPCA. The crowd was treated to songs throughout the decades by the Andrew Walesch Big Band, a Minneapolis-based orchestra, a stage performance and a series of videos commemorating the past 50 years.

In addition to the association's activities, the NPCA Foundation raised money to benefit scholarship and outreach programs through its silent auction and a fundraising event at WhirlyBall Twin Cities.

OFFICERS:

Chairman of the Board
Andy Wieser, *Wieser Concrete Products*


Andy Wieser

Chairman-Elect
Greg Stratis, *Shea Concrete Products*

Secretary/Treasurer
Ashley Smith, *Smith-Midland Corp.*

NEW BOARD MEMBERS:

Directors – 3-Year Term
Don Graham, *Jensen Precast*
Amy Burnett, *Barbour Concrete Co.*
Pat Liston, *Forterra Pipe & Precast*

Associate Member – 3-Year Term
Marianne Methven, *Hamilton Form Co.*

AWARDS:

Committee Chair Service Awards
Armen Alajian, *Arto Brick*
Don Graham, *Jensen Precast*
Stephanie Loud, *Mountain West Precast*

Board of Directors Service Awards
Brent Dezember, *StructureCast*
Jonathan Ohmes, *Champion Precast*
Paul Heidt, *Garden State Precast*
Terri Rondeau, *Besser Company*

Foundation Service Award
Jonathan Ohmes, *Champion Precast*

Top Gun Awards Recognition
Top Gun Level
Jennifer Burkhart, *Arrow Concrete Products*
Michael Hoffman, *Lindsay Precast*
Sam Lines, *Concrete Sealants*
Greg Roache, *Gainey's Concrete Products*
Marvin Smith, *SI Precast*

First Merit
Greg Stratis, *Shea Concrete Products*

Second Merit
Brent Dezember, *StructureCast*

Third Merit
Leo Feuerstein, *Western Precast Concrete*
Andy Wieser, *Wieser Concrete Products*

Brent Dezember, StructureCast (left), receives the Douglas G. Hoskin Award from last year's honoree, Leo Feuerstein, Western Precast Concrete Inc.

Douglas G. Hoskin Award
Brent Dezember, *StructureCast*

Robert E. Yoakum Award
Chuck Babbert, *E.C. Babbert*

CHUCK BABBERT – 2015 ROBERT E. YOAKUM AWARD WINNER

Chuck Babbert is NPCA's 47th winner of the Yoakum Award, one of the longest-running and most prestigious honors in the precast concrete industry.

Babbert's journey in the precast industry started much like others who grew up in a family business. When he was young, his father and company namesake, E.C. Babbert, gave him odd jobs around the plant like sweeping floors. As he got older, he learned the company from the bottom up, first working in production and then sales and marketing. Currently, he is president of sales and manages the family business with his brother, Ron Babbert, who is president of production.

Babbert said his desire to get involved in NPCA bloomed while watching his father's involvement as chairman of the board in 1975. E.C. won the Yoakum Award in 1977. He has served on numerous committees as well as the Board of Directors. He is also a fixture at NPCA meetings and is a friend to many.

Chuck accepted the award to a standing ovation at the NPCA 50th Annual Convention Chairman's Banquet. When asked what it meant for him to receive the award he said, "The Yoakum Award to me is like winning the Heisman Trophy in college football. It's what you receive for the work you put in. I feel privileged to have been the one to receive the award, especially at the 50th Anniversary."

FOUNDATION SCHOLARSHIP DEADLINE JAN. 25

As we move into the fall and winter seasons, the NPCA Foundation Scholarship application drive is ramping up. You can find the applications for both the undergraduate and graduate scholarship applications on the NPCA Foundation website at precast.org/foundation.

Scholarship application are due January 25, 2016. Please share this information with your precast concrete industry network, friends, employees and local high schools, vocational schools and colleges. Should you have any questions about the scholarship application process, contact Marti Harrell, director of Education and Training and executive director of NPCAF, at mharrell@precast.org or (800) 366-7731. **PI**

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

FORTA CORP. VICE PRESIDENT SUCCUMBS TO CANCER

Jeffrey "Jeff" B. Lovett, vice president of operations for FORTA Corp. in Grove City, Pa., died Sept. 15, 2015, after a 54-week battle with cancer. Having recently celebrated his 35-year work anniversary, he was influential in the development and growth of the company. His innovations set industry standards and resulted in his inventor status for seven issued patents, with additional patents pending.

Jeffrey Lovett

Larger than his professional accomplishments were his engaging personality and permanent smile that created friendships and lasting relationships. Jeff is survived by Jennie, his wife of 35 years, and sons Christopher and Garrett.

PERMATILE CONCRETE PRODUCTS HOSTS VIRGINIA TECH SENIORS

NPCA member Permatile Concrete Products of Bristol, Va., hosted 30 seniors from the Building Construction Curriculum at Virginia Tech University on Sept. 24, 2015. After the plant tour, the group visited The Bristol Motor Speedway, where they viewed the tunnels and stairwells supplied by Permatile Concrete Products.

Virginia Tech Seniors at Permatile Concrete Products, Bristol, Va.

Monica Schultes

PENNSYLVANIA PRECAST ASSOCIATION APPOINTS NEW EXECUTIVE DIRECTOR

The Pennsylvania Precast Association announced the recent appointment of Monica Schultes, P.E., as executive director. Schultes has spent 13 years as director of the Mid-Atlantic Precast Association and several years with a precast manufacturer. In her new role, Schultes will represent the precast concrete industry in Pennsylvania.

JIM RENDA JOINS CRESSET CHEMICAL COMPANY

Cresset Chemical Company welcomes Jim Renda as vice president of sales and marketing. He will oversee the company's worldwide sales force as well as all advertising and public Relations. He has been a member of Cresset's Advisory Board for the past 25 years.

Jim Renda

SELIG RECEIVES FRANK J. HEGER AWARD

ASTM Committee C13 on Concrete Pipe presented Roman J. Selig III and Eric Carleton, P.E., with the Frank J. Heger Memorial Award. Selig is the national accounts manager at Hamilton Kent. Eric Carleton is vice president of technical services for NPCA. The Heger Award recognizes their services and dedication to Committee C13.

(Left to Right) Josh Beakly, ACPA, Eric Carleton, NPCA, Roman Selig, Hamilton Kent, and Fred Cash, ASTM C13.

ADVANCED CONCRETE TECHNOLOGIES ANNOUNCES LEADERSHIP TRANSITION

Advanced Concrete Technologies announced that Vice President Erik Johansen will step in as the company's new president, while current president and founder, Max Hoene, focuses as chairman on key accounts and strategic planning. Johansen has more than 20 years of industrial expertise in the international concrete mixing and batching plant industry.

Erik Johansen

Molin Concrete's New Plant

LHV PRECAST RECEIVES BUSINESS RECOGNITION AWARD

NPCA member LHV Precast of Kingston, N.Y., received the 2015 Small Business Award at the Ulster County Regional Chamber of Commerce and the Ulster County Economic Development Alliance annual business recognition dinner. The award recognizes the company's dedication and commitment to furthering business and the quality of life in Ulster County.

MOLIN CONCRETE PRODUCTS DEDICATES NEW PLANT

Molin Concrete Products of Lino Lakes, Minn., dedicated its new automated carousel wall panel plant in Ramsey, Minn. The automated carousel system was designed, manufactured and installed by Weckenmann Anlagentechnik GmbH & Co. KG of Dormettingen, Germany. Weckenmann is represented within the United States and Canada by Spillman Company. Hermann Weckenmann, co-president of Weckenmann and Ted Coons, Chairman and CEO of Spillman, developed, implemented and executed the project with the cooperation of Matt Westgaard, COO of Molin and the entire management and production team. **PI**

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EVOLUTION

The Precast Concrete Industry Comes of Age

National Precast Concrete Association

1965-2015

Board members join a local dignitary to cut the ribbon for the NPCA 3rd Annual Convention in Buffalo.

A (Unit) Step Forward

1965-1974

LOOKING BACK

What started out as a conversation among a few has turned into a national association dedicated to promoting the precast concrete industry. According to Theodore W. Coons, chairman and CEO of Spillman Co., the early conversations about what eventually became the National Precast Concrete Association started around 1960. He remembers his parents talking with a group of step manufacturers who, "felt there wasn't a voice for precasters in North America," according to Coons.

Robert E. Yoakum, 1965.

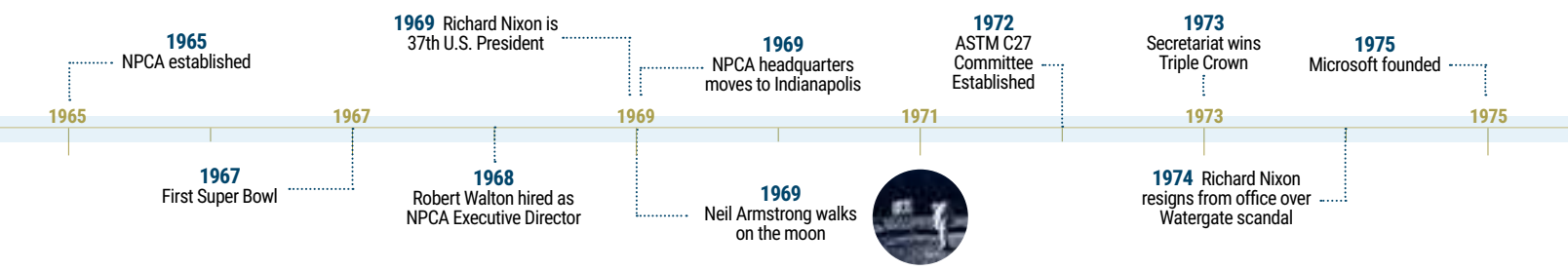
VISIONARY

According to Douglas G. Hoskin, who was one of the early organizers of the group, conversations became more serious around 1963, as the Unit Step Manufacturers Association held a winter meeting in Elkhart, Ind. Attendance and enthusiasm were both in low supply before the meeting began. Hoskin wrote that one visionary unit step manufacturer stood up to speak.

"Bob Yoakum from Dayton, Ohio, took the floor," Hoskin wrote. "He proposed that instead of calling it a day as unit step manufacturers, we should open our doors to all smaller precast manufacturers and start a new association."

Yoakum told the group that the unit step manufacturers should form an alliance similar to the Bureau International du Béton Manufacturé meetings that he and William Coons and others had attended with their wives. BIBM is a European alliance of national and regional precast associations that at the time was working to advance an industry in its early stages. He persuaded the attendees to go along with the idea to reach out to other precast manufacturers and change the name of the group. "Bob was a great salesman," Hoskin wrote.

In the fall of 1963, Hoskin organized a group in Woodstock, Ontario, to formally present Yoakum's idea to the group and draft a new constitution. The group agreed on a new name, the National Precast Concrete Association. In April 1965, NPCA had its first meeting in Dayton, Ohio, to approve the new bylaws and formally launch the association. The first Convention began in the midst of tragedy. As attendees arrived at Yoakum's Dura-Crete plant for the meeting, they learned that Robert Yoakum had passed away the previous night. The Yoakum family requested that the Convention continue, and many attendees spent part of the second day attending Robert Yoakum's funeral.



Officers seated at a head table was the custom in the early days. NPCA leaders dine by candlelight in Denver, 1969.

Inderwick presents the president's plaque to Moeller in 1971.

RAPID GROWTH

As the association quickly grew in the next years, it became too large for the all-volunteer leadership to manage. The Board of Directors hired Thomas C. Brower, the head of a trade association management firm, as the executive director to oversee the day-to-day business.

By 1968, Brower had moved on and the Board hired Bob Walton of Walton & Associates, a management company that administered several associations. Walton moved NPCA's headquarters to his office in Indianapolis, where it remains today. He worked closely with the Board for the next 25 years as a consultant and day-to-day manager.

In 1972, NPCA contacted ASTM, the international standards-setting body, and established Committee C27, the first-ever devoted to precast concrete products. The committee, still active today, provided precast concrete manufacturers a separate identity from the ready-mix side of the industry. This spurred the creation of business relationships and long-lasting friendships among NPCA member families.

Many friendships began in this era while families planned post-meeting vacations together to the Bahamas; Apollo Beach, Fla.; Mexico City; Lisbon, Portugal; Hawaii and the Grand Canyon. Trips also included attending international BIBM conventions and related "study tours" throughout Europe. Members then applied what was learned abroad to their own plants, fueling advances in the precast concrete industry in North America.

RIGHT: Dura-Crete employees pose for a photo at the first NPCA plant tour. BELOW: By 1969, the 4th Annual Convention and trade show in Denver was a well-attended event.

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An overhead look at the second heavy equipment trade show at the NPCA 18th Annual Convention in 1983 in Columbus, Ohio.

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1975-1989

INCREASED TRAINING

By 1975, NPCA membership had grown to more than 500 companies. With membership rising exponentially, NPCA leaders sought training opportunities to improve quality, increase safety and share information that would add value for new members.

Paralleling the association's growth, the newly developed ASTM Committee C27 was also making developments by producing standards for precast concrete products. NPCA joined the bandwagon and formed a Standards Committee to aid the progress. It was among the first new committees formed in the mid-1970s. Other committees included Membership, Convention Planning, an early version of the Safety Committee and Production/Distribution. In 1979, NPCA's trade show was also beginning to take shape. According to Coons, Cincinnati hosted the first heavy equipment trade show in 1979.

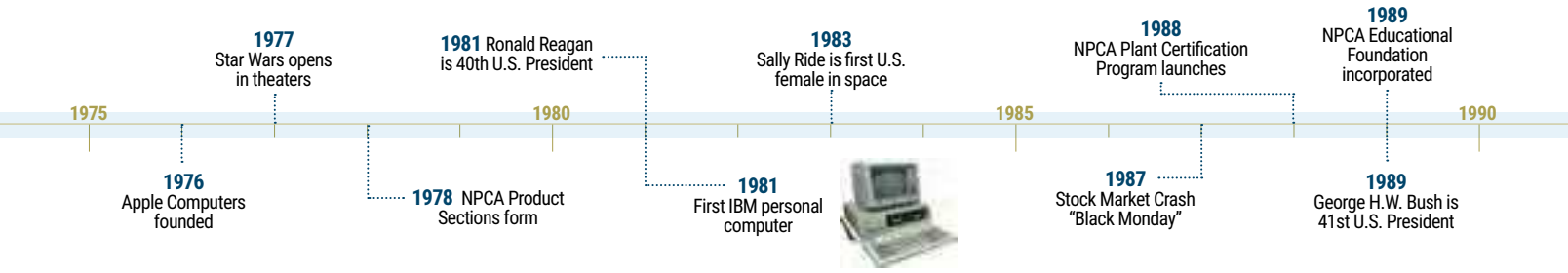
Gold Blazer winners for membership recruitment in 1977.

'80S RECESSION

The flow of new ideas, information and technology brought excitement to the industry, but the good times came to an abrupt halt when a recession hit the early 1980s. NPCA leaders used this opportunity to offer support to members by launching a marketing program, developing quality standards, increasing production training and promoting safety and innovation.

In 1986, the Production/Distribution Committee approved the development of the NPCA Quality Control Manual for Precast Concrete Plants at its meeting in Columbus, Ohio. The manual was the foundation for the Plant Certification Program. In addition, through NPCA's relationship with PCA, members received training in production methods. According to NPCA newsletters, courses were well-attended and highly rated by students.

A medallion of the NPCA logo from the 1980s.



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TOP: Future presidents Fred Heitman (left, 1989) and Tom Vildibill (1992) pose with plaques at Discovery '86. ABOVE: The Portland Cement Association hosted concrete fundamentals classes for members at its Skokie, Ill., facility before NPCA launched its Production and Quality School. Pictured are members of a 1979 class.

Early Publications (from top): NPCA's Qualtiy Control Manual, circa 1977; NPCA's 10th Anniversary Program, 1975; 1979 National Precaster Newsletter; NPCA's Convention promotion, 1981.

CONTINUED ADVANCEMENT

By the mid-1980s, the effects of the recession were finally lessening and NPCA's exposition continued to evolve as a full-service heavy equipment trade show packed full of exhibitors and attendees. In 1985, the Board approved a new scholarship fund to be instituted over a four-year trial period. The fund granted a two-year scholarship of $1,000 per year to students who were pursuing an education in a concrete-related field. The success of the program led to a formalized scholarship effort with the formation of the NPCA Educational Foundation in 1989.

Times were good, and as a result of the recession, member relationships were even stronger. Members reconvened at post-meeting trips to BIBM in Japan, Israel and Australia and shared new product information, production methods and business management techniques. However, as programming and membership continued to expand, NPCA leaders foresaw a need to move the association into a more professional direction in the 1990s.

In 1962, Dan Houk (left), age 4, and his brother Mark, 6, watched their father and others work on the construction of a new plant at the Wilbert Precast facility in Spokane, Wash. Dan is now president and CEO of the company.

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The trade show floor for the NPCA 25th Annual Convention in Phoenix.

A New Paradigm

1990-1999

NEW LEADERSHIP

NPCA launched into the 1990s on a rocky start. Recession returned, and the economic challenges proved difficult for most precasters, including incoming NPCA President Greg Chase. At a time when he needed to work through the pains of recession at his Brookfield, Mass.-based company, he was taking on a growing set of responsibilities as the leader of a national trade association. The competing responsibilities each required immense dedication and time, luxuries he didn't have.

NPCA leaders were learning that running the association was a full-time job in its own right, so they sought to hire a professional executive to push the association to hire levels. In 1992, the NPCA Executive Committee announced that Albert Leitschuh would become NPCA's first full-time executive. In the new organization, Leitschuh would retain the title of president, while the leader of the Board would become chairman. However, Leitschuh's time was cut short as he did not mesh with the Board leadership.

For the second time in the new decade, NPCA conducted a search for a president. In 1994, Ty E. Gable, an executive vice president with the Associated Builders and Contractors chapter in Washington, D.C., was hired. With a new long-term president on board, NPCA entered a period of increased outreach, new programming and change.

ABOVE: Greg Chase, 1990. LEFT: An NPCA display. board tracks the first 25 years of the association.

1990 Hubble Telescope launches

1991 Management company hires staff dedicated specifically to NPCA

1992

1993 Bill Clinton is 42nd U.S. President

1994 First Manufactured Concrete Exposition (MCX)

1994 Ty E. Gable hired as NPCA president

1995 Major League Baseball strike ends

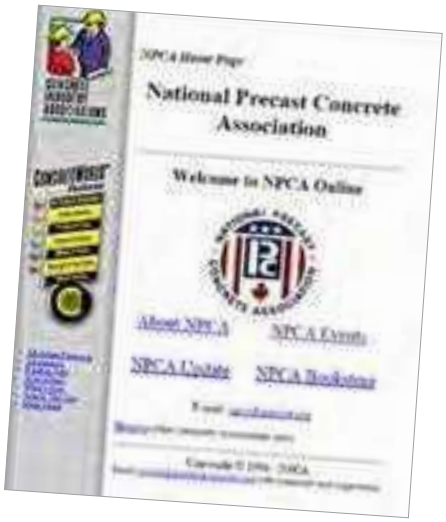
1995 MC Magazine launches

1996 First NPCA website launches

1997 NPCA Educational Foundation starts scholarship endowment campaign

1998

1999 The Euro is introduced



ABOVE: The home page for precast.org when it came online in 1996. LEFT: Past NPCA president Fred C. Heitman (top) poses for a picture with 1996 chairman of the Board, Scott Ditcher.

REACHING OUT

The first item on Gable's agenda was to reach beyond membership to the industry at large. He launched MC Magazine (the MC stood for "manufactured concrete") in the spring of 1995 and mailed a copy to every precast plant in North America.

NPCA's education courses also began forming in the mid-1990s. Mel Marshall, a precast concrete expert with a consultant business based in Surrey, British Columbia, helped transform the courses taught at PCA to a more precast-specific curriculum. The course titled "Production & Quality School 1," now known as PQS I, was first taught at the PCA offices in Skokie, Ill. Along with education, the Plant Certification Program also expanded. NPCA hired a nationally known independent inspection firm to conduct audits of certified plants. In 1996, the number of certified plants grew to 57 from 37 as U.S. Department of Transportation agencies and other entities began seeking quality assurance guarantees.

Technology also took a significant step forward in the 1990s as the Internet emerged. NPCA launched its first website in 1996.

Even with these rapid changes in the association, one thing remained the same: members helping members. It's a continued presence that has stayed strong even into the new millennium.

The entrance for NPCA's first Manufactured Concrete Expo, 1994 in Nashville

The 1990 NPCA leadership team

George Gasperson and Tom Lynch pose with awards from the 1990 convention.

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Lean Forward!

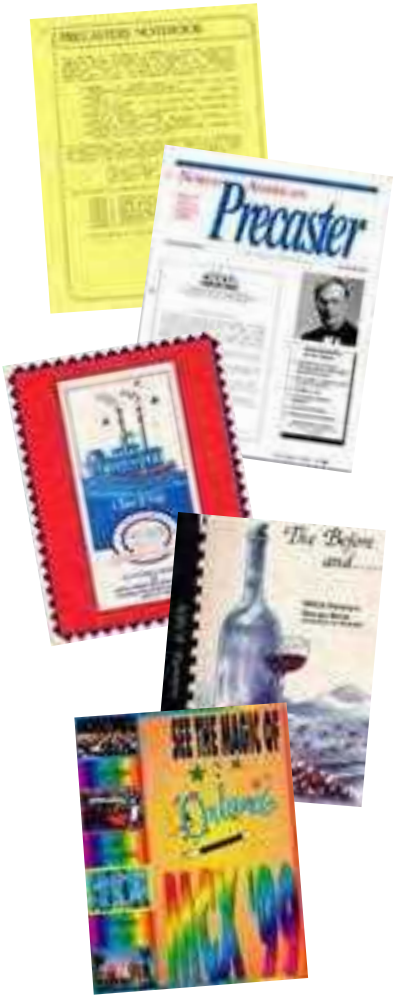
In the first edition of MC Magazine, Spring 1995, Howard Bradfield, founder of Anchor Concrete Products, Kingston, Ontario, talked about how he acquired his first office building for the plant.

"We bought a 10-by-10 building from a local used car dealer and proceeded to haul it back to our property," Bradfield told the MC reporter. His two young sons were with him in a loader/unloader truck they had adapted with help from a local welder. They suspended the building from the back of the homemade A-frame loader/unloader and started the 3-mile trip back home.

"On the way back, we slowly climbed up a very steep hill – so steep that, with all of the weight on the back of that truck, at one time I felt that we had reached the point of equilibrium," Bradfield said. "I yelled to the boys to lean as far forward as they could, and we just barely managed to get over that hill and safely back to our place."

TOP: Cutting the ribbon to open the trade show. ABOVE LEFT: (from left) Len Worden, Roland Lindsay and Theodore W. Coons meet on the trade show floor during the 25th Annual Convention. LEFT: Mary Beth Rainero (at right), secretary and a chief fundraiser for the NPCA Educational Foundation, works the 1996 raffle.

RIGHT: A soggy plant tour in Seattle, 1998. BELOW RIGHT: George Gasperson awards Nina Courter a gold jacket for membership in 1990. BOTTOM LEFT: Rosemary and Barney McGuire at a 1996 event. BOTTOM RIGHT: This Cincinnati group at the NPCA 27th Annual Convention in 1992 included (from left) Ann and Ashley Smith and (at right) Peter Baxter.



1990s publications (top to bottom): NPCA's first Precasters Notebook, 1991; North American Precaster, 1991; NPCA 1992 Convention Program; NPCA Partners Recipe Book, 1992; MCX 1999 Program.

In 2009 NPCA and the American Concrete Pipe Association partnered in a new version of the trade show, known as The Precast Show. The first event was in Houston.

A Turning Point

2000-2015

ADVANCING INDUSTRY EDUCATION AND QUALITY

The first 15 years of the new millennium brought important advancements to NPCA's programming, especially in the areas of education and plant certification. Competition from new materials was threatening precast concrete, and leaders believed quality needed to be foremost in the mind of precast producers if the industry was to get stronger. NPCA leaders also saw the need for a more educated workforce to handle the technical breakthroughs in the industry, such as revolutionary mix designs like self-consolidating concrete, ductile concrete and the growing diversity of product size and complexities. In response, the Education Committee created a career path for production workers known as the Master Precaster program.

Precast University launched in 2008 and included a set of technical courses, safety training, a prestressed component (or elective) and a capstone leadership course. When all the coursework was completed, a production worker would graduate and earn the designation of Master Precaster. A gold-colored hardhat was then awarded at graduation. Mike Loy from Bethlehem Precast in Bethlehem, Pa., became the industry's first Master Precaster in 2012. By 2015, several member plants had multiple Master Precasters on board.

LEFT: In the 2008 membership campaign, 29 members recommitted to NPCA. Working the phones that day were (from left): Michael Tidwell, Bartow Precast; Loretta George, Gainey's Concrete Products; Susan and Fred Machledt, CGM Precast Concrete; and Richard Isaacson, iwi group LLC. BELOW LEFT: Bruce Glaser, outgoing chairman of the Board, looks at the show guide for the 2004 Manufactured Concrete Products Expo in Atlanta.

2002 Precast Solutions magazine launches

2006 NPCA membership surpasses 1,000 companies

2007 Apple launches first iPhone

2008 MC Magazine becomes Precast Inc.

2009 Barack Obama is 44th U.S. President and America's first African-American president

2012 Plant Certification Program earns ANSI accreditation

2012 First Master Precaster graduates

2000 | 2003 | 2006 | 2009 | 2012 | 2015

2001 9/11 terrorist attacks on U.S.

2003 MCPX trade show forms

2007 The Precast Show is created

2007-2009 The Great Recession hits

2009 Precast University launches

2011 The Precast Show list of sponsoring groups grows to five with NCMA, ICPI and CSI joining NPCA and ACPA

2015 NPCA celebrates its 50th year

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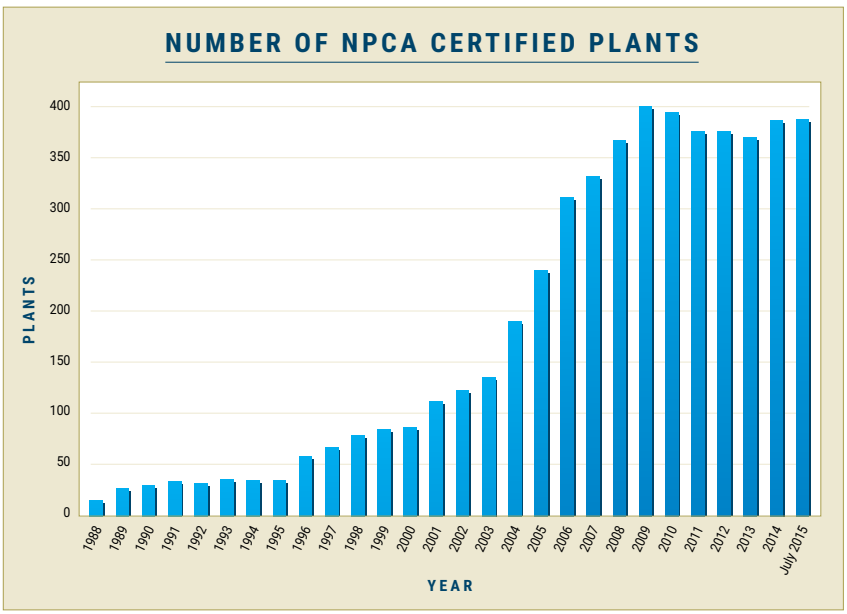
Education grew steadily through the decade, as seen by this class at the 2008 MCPX in Denver.

CERTIFICATION PROGRAM ACCREDITED

In the 2000s, the NPCA Plant Certification Program became the largest precast certification program in the industry. It expanded every year from 2000 to 2009, starting with 78 plants and increasing to 402 in that timeframe. The number of states requiring certification also increased as DOTs learned about the benefits of NPCA's quality assurance program from members and staff. In 2012, the certification program reached another milestone when it attained accreditation from the American National Standards Institute, providing an even higher level of quality assurance to specifiers and regulators. By 2015, DOTs in 41 states required some component of NPCA certification.



TRADE SHOW EVOLVES

Along with programming progressing, the trade show also evolved. In 2000, NPCA announced the Manufactured Concrete Products Expo. The first MCPX event was held in 2003. The event set records with 94,000 net square feet of exhibits and 84 first-time exhibitors.

THE GREAT RECESSION

The Great Recession, which began in 2007 and lasted until June 2009, greatly impacted the precast industry. According to the Economic Policy Institute, the U.S. labor market lost 8.4 million jobs. It was a challenging time for precasters. NPCA staff worked diligently to keep the budget balanced and many precasters and suppliers maintained their memberships despite the economic decline.

ABOVE: The NPCA Educational Foundation grew substantially and branched out into new areas in its first 25 years. RIGHT: Greg Roache, supported by his "Think Pink" crew from Gainey's Concrete, makes a Pinnacle Award presentation in 2008. BOTTOM LEFT: Equipment still sold at The Precast Show in 2009, despite the Great Recession. BOTTOMRIGHT: Dan Houk passes the gavel to Tom Engelman to start the 2012 term.

MASTER PRECASTERS

2012 GRADUATE

Mike Loy	Bethlehem Precast Inc.

2013 GRADUATES

Tim Kerlin	Bethlehem Precast Inc.
Bob Palmer	Foley Products Company
Loretta Bodi	Gainey's Concrete Products Inc.
Jude Mandes	Gillespie Precast LLC
Gerald Lajoie	Jefferson Concrete Corp.
James Motes	Jefferson Concrete Corp.
John Vitale	Northeast Concrete Products LLC
Frank Bowen	Piedmont Precast
Chris Neuman	Wieser Concrete Products Inc.
Brock Gill	Wilbert Precast Inc.
Chad Risley	Zeiser Wilbert Vault Inc.
Jeremy Sherman	Zeiser Wilbert Vault Inc.

2014 GRADUATES

Josh Gaines	Bartow Precast Inc.
Jason Fitzwilliam	Cementum Inc.
Randy Hayes	Diamond Precast Concrete Ltd.
Jarrett Bodi	Gainey's Concrete Products Inc.
Troy Taguma	Hawaii Precast Inc.
Josh Stassen	Hy-Grade Precast Concrete
Timothy Campbell	Jefferson Concrete Corp.
Ricky Durdon	Jefferson Concrete Corp.
Mohamad Sabra	Khalid Cement Industries Complex
Dave Buttazzoni	Precon Precast Products
Scott Cunningham	Precon Precast Products
Randy Slawosky	Precon Precast Products
Antonio DiRocco	Shea Concrete Products Inc.
Edward Lopez	Shea Concrete Products Inc.
Richard Alvarado	Western Precast Concrete Inc.
David Feuerstein	Western Precast Concrete Inc.
Leo Feuerstein	Western Precast Concrete Inc.
John Franklin	Western Precast Concrete Inc.
Jorge Rodriguez	Western Precast Concrete Inc.
Paul Pecoraro	Wilbert Precast Inc.

2015 GRADUATES

Benjamin Engelman	Bethlehem Precast Inc.
Julio Cora	Concrete Systems Inc.
Trevor Laws	Crest Concrete Products Inc.
Brittany Richardson	Gainey's Concrete Products Inc.
Jorge Nunez	Hy-Grade Precast Concrete
Raymond Cramer	Jefferson Concrete Corp.
Doug Dickerson	Jefferson Concrete Corp.
Julio Garcia	Jefferson Concrete Corp.
David Lee	Lee's Precast Concrete Inc.
Nelson Martin	Lee's Precast Concrete Inc.
Eric Lasko	Monarch Precast Concrete Corp.
Mark Gorgas	Northeast Precast LLC
Greg McMullin	Reading Rock Inc.
Jason Hendricks	Wieser Concrete Products Inc.

MARKETING EFFORTS EXPAND

Marketing remained important, with various ideas taking shape and evolving as economic forces, technology and competing materials altered the landscape. In 2002, the NPCA Marketing Committee launched Precast Solutions magazine. Targeting the specifying community, the magazine would be designed as a marketing publication, featuring brief case studies illustrating the many benefits of precast concrete. The first issue, published in January 2002, went into production shortly after the terrorist attacks of Sept. 11, 2001, and described how the precast industry quickly stepped up to provide security barriers for public buildings in the aftermath of the attacks. Marketing efforts also took an online direction with the development of NPCA's new website. By 2015, precast.org had evolved from a static page to become the hub of all NPCA communication.

A BRIGHT FUTURE FOR NPCA

What started as the vision of a small group of precasters and suppliers, has turned into a collaboration of hard-working men and women to create a voice for the precast concrete industry. NPCA members contributed much in the past 50 years to improve product quality, add education and training for production employees, and share innovations and advancements with each other. Today's industry is a reflection of the ups and downs they shared. It's a history worth remembering and celebrating as future generations continue to move it forward into the next 50 years. **PI**

ABOVE: NPCA's redesigned precast.org website, 2015. BELOW: The 2014 Master Precaster class dons their gold hardhats for a photo after their graduation at the Salute to Excellence in Houston.

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Breidenbaugh's Inc.

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Smith Pre-Cast

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Brooks Products

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Decor Precast Company Ltd.

1992 – R. Thomas Vildibill
San Diego Precast

1993 – Randy Yoakum
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1995 – Harry W. Hayward
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Lindsay Concrete Products Co.

2000 – Jim Adams
Cretex Co. Inc.

2001 – Bruce Hottle
Eagle Concrete Products Co.

2002 – John Lendrum
Norwalk Concrete Industries

2003 – Bruce Glaser
APS Concrete Products Inc.

2004 – Vernon Wehrung
Modern Precast Concrete

2005 & 2006 –
Joan Blecha
Hanson Pipe & Precast

2007 – Dan Barbour
Barbour Concrete Co.

2008 – Philip Burkhart
Utility Concrete Products LLC

2009 – Randy Lindsay-Brisbin *Lindsay Precast Inc. – Firebaugh Div.*

2010 – J. Kirby O'Malley
Garden State Precast Inc.

2011 – Dan Houk
Wilbert Precast Inc.

2012 – Tom Engelman
Bethlehem Precast Inc.

2013 – Mimi Rainero Coles
Permatile Concrete Products Co.

2014 – Brent Dezember
StructureCast

2015 – Michael Tidwell
Bartow Precast Inc.

2016 – Andy Wieser
Wieser Concrete Products

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Colorado Convention Center and Hyatt Regency Denver
Denver, Colo.

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