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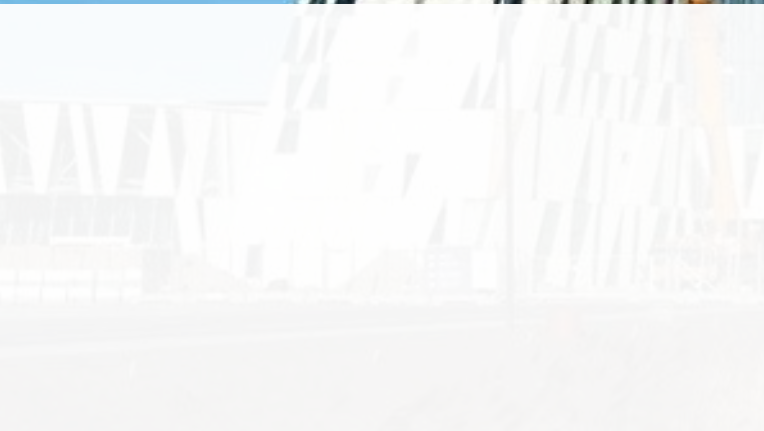
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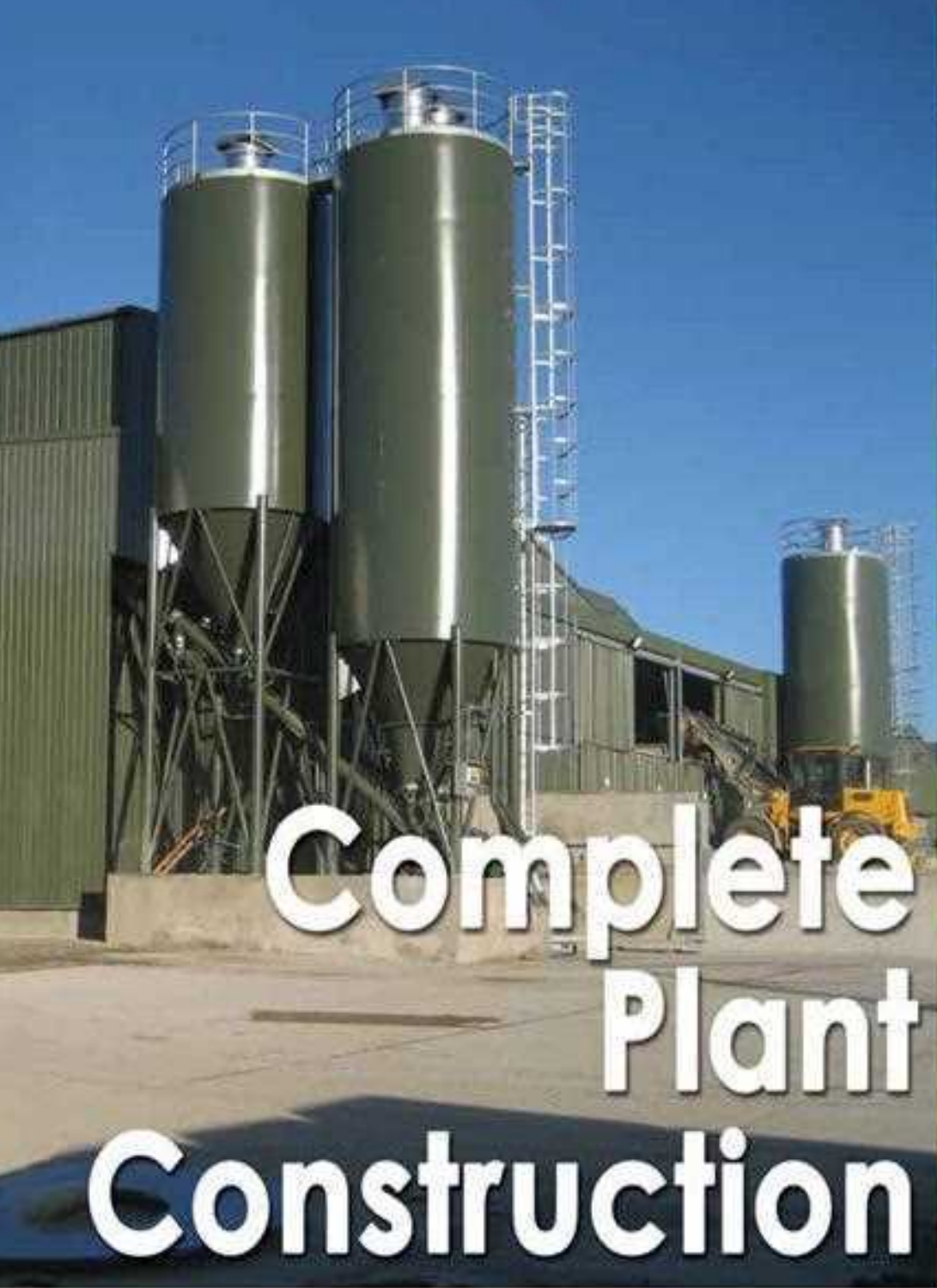
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While renewed housing demand has pushed the construction industry on an upward trend and some precasters are doing quite well, the big picture is that the big housing recovery is not as robust as expected.

Our Connected World

BY BRENT DEZEMBER | *Chairman, National Precast Concrete Association*

If you think back to the beginning of this century - just 14 years ago - you may remember being amazed at how much our world was changing as we crossed into the new millennium. We were in the middle of the dot.com bubble, and out here in Central California we were close to the epicenter of it all. The Y2K computer systems crash that was supposed to vanquish the world didn't happen on Jan. 1, 2000. And while we all breathed a sigh of relief that our businesses didn't come to a halt, it did throw a spotlight on how interconnected we were and how dependent we had become on technology.

But that seems like the stone ages compared to our world today. In 2000, Facebook wasn't even an idea. Google was a 15-month old fledgling that had just barely outgrown the garage in which it was founded. YouTube didn't come around until 2005. And in 2000, the idea of getting emails on your phone was just a novelty for most precasters. Why would anybody want a phone that gets emails?

Even if you don't use Facebook or Google or YouTube in your business or personal life, you can see how they have continued to alter our world. But we're not just connected through technology. Seismic shifts happen that impact our precast concrete businesses, and if we're not constantly scanning the environment and peering over the horizon, we could disappear faster than Netscape (anybody remember Netscape?).

Here's an example of how something seemingly far removed from the precast concrete industry can actually impact your bottom line. Exploding college tuition and student loan debt are topics that have been in the news for the last several months. If you have children in college, you know all about it. But what's that got to do with precast?

Think back about 18 months. Some economists were forecasting a strong rebound for the construction industry after the Great Recession. After four years of stagnation it looked like 2013 was the year when the housing recovery would

lift the construction economy to growth of 6% or more. There was pent up demand in the housing market. People who stayed on the sidelines during the Great Recession were going to start buying houses. New developments would spring up, and there would be demand for septic tanks, pipe, curbs, paving stones and all sorts of other precast materials. Commercial developments would follow closely behind, and other infrastructure to service those new developments would keep our plants humming - just like recoveries in years past.

But while renewed housing demand has pushed the construction industry on an upward trend and some precasters are doing quite well, the big picture is that the big housing recovery is not as robust as expected, so the pace of the recovery is slower than expected. Why? Because many of those 30-year-olds who are in their prime first-time home buying years are still on the sidelines. They're delaying marriage or living with mom and dad until they can pay down their student debt. And the job market they're looking at does not have near the promise of the job market when many of us entered the workforce a generation ago.

Of course there are many other contributing factors, but more and more economists are pinning at least part of the blame for a slow recovery on the collective \$1 trillion in student debt that young people are struggling to pay down.

So even if student debt is not a problem in your family, it could still be impacting your business. It's just one of the many examples of how we're more connected than ever and how, as business owners and managers, we need to constantly be aware of what is happening in the world outside our plants.

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Outstanding precast designs found around the world.

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Compress for Success

Expert explains why making, curing and testing concrete cylinders is necessary in the field.

BY ERIC CARLETON, P.E.

The cylinder compression test. It's a regular occurrence in nearly every precast concrete plant. Why do we spend all this time making and breaking concrete cylinders and painstakingly recording the results? Some precasters look at concrete cylinder testing as little more than a make-it-and-break-it chore to maintain certification or appease the purchasers' specifications. There are, however, many reasons why a precaster should want to cast and test concrete cylinders, regardless of the project or certification requirements.

Although ASTM C31 published its original *Standard Practice for Making and Curing Concrete Test Specimens in the Field* in 1920, confusion still exists among some precasters about the proper procedures for casting, curing and testing concrete cylinders for concrete mixes and products. Below is a comprehensive list describing reasons why it is important to conduct concrete cylinder compression tests:¹

Testing:

1. Ensures the concrete was batched properly: that is, the proper ingredients, in the proper proportions, were used and the laboratory mix design was adequate.
2. Indicates the statistical variability on the properties of the concrete being produced. High variability is an indication of poor practice.
3. Reveals problems arising due to inadvertent changes in the materials or environmental conditions.
4. Ensures that the people involved in the production, delivery and placement of the concrete do not become lax or careless in their operations.
5. Helps pinpoint the problem even if structural problems arise. Properly carried out and documented tests will be key.
6. Sets timelines for further construction operations to be carried out. For instance, strength tests may be used as a guide for form removal.

The data available to precast concrete manufacturers through testing leads to quick and economical choices to correct problems should they arise. You may never need concrete cylinder testing information until you really need it; and then you may wish you had lots of it. And, of course, by then it is too late. Additionally, it is an easy method for tracking hardened concrete trends for long-term efficiency adjustments, leading your company to the first steps of continuous improvement.

Standard testing made easy

Within the past decade, major changes to standard testing have made it easier to cast and test concrete cylinders. The first is testing and specifying agencies acceptance of the use of unbounded caps in accordance to ASTM C1231 *Standard Practice in Determination of Compressive Strength of Hardened Concrete Cylinders*. Though this practice was first published in 1993, many agencies hung on to the established methods of capping by high strength mortar or the cumbersome, and somewhat dangerous, capping method of molten sulfur. When proper testing procedures are met, such as using correctly sized retaining rings and not exceeding the maximum of 100 tests per pad (50 per side), unbounded caps will provide consistent results.

Another change that has eased the burden of cylinder testing is the widespread acceptance of the 4 in. by 8 in. high cylinder shape in lieu of the long-standing 6 in. by 12 in. specimen. Besides the handling weight advantage of the smaller samples, the greatest gain is the ability to take the test to an ultimate failure result. Modern precast concrete mixes produce hardened concrete with compressive strengths that routinely exceed 7,000 psi in a week to 14 days. This requires high ultimate loads to break the 6 in. by 12 in. cylinders. This load can exceed the gauge limit on the testing machine. Constant loading to the maximum loads has proven detrimental to the cylinder break testing frames. Consequently, many testing technicians stop the test to save the equipment. This still verifies the mix far exceeds the original specified requirements, typically 4,000 psi, but denies the ultimate strength data that could be used for consistent observations or mix optimization. The smaller specimen size provides the best compressive strength results.

Some of the critical criteria for the allowance of the smaller diameter is similar to the larger 6 in. by 12 in. specimen, including the maximum size of the course aggregate used in the concrete mix not exceeding a 1/3 of the cylinder diameter. The 4 in. diameter cylinder means 1.33 in. However, some specifying agencies have limited the maximum aggregate size to 1.25 in. or



NPCA file photo

MATT ANDERSON PLACES A CONCRETE CYLINDER INTO THE STRENGTH TEST MACHINE IN THE COMPANY LAB AT PRO-CAST PRODUCTS IN HIGHLAND, CALIFORNIA.

TABLE 1. Methods of Making and Consolidating Dry Mix Concrete Cylinders for Compressive Strength Testing

ASTM	Subject	Sample Size	Lifts	External Vibration vib/min.	Surcharge (lbs.)	Notes
C31	Practice for Making and Curing Concrete Test Specimens in the Field	6x12	2	-	-	Internal vibration only
		4x8	2	-	-	Internal vibration only
C192	Practice for Making and Curing Concrete Test Specimens in the Laboratory	6x12	4	≤3600	10	If low W/C ratio prohibits internal vibration, manufacture and externally vibrate-Note 16
		3x6	3	≤3600	2.5	
C497	Test Methods for Concrete Pipe, Manhole Sections, or Tile	6x12	3	≤800	9.2	Reference to C31 or by methods comparable to concrete of manufactured product. Surcharge weight based on 0.353 psi and diameter less .25 in. of cylinder mold. Sizes other than 6 in. by 12 in. are not prohibited.
		*4x8	3	≤800	3.9	
C1176	Practice for Making Roller-Compacted Concrete in Cylinder Molds using a Vibrating Table	6x12	3	≤3600	20	

even 1 in., which still complies with a large majority of precast concrete mix designs.

The concrete industry and academia agree that smaller cylinders will produce slightly higher compressive strength results.^{ii, iii} Additionally, original testing results indicate the 4 in. by 8 in. cylinders had greater variability of testing results as

compared to the 6 in. by 12 in. cylinders. This has led regulatory agencies to require the breaking of three 4 in. by 8 in. cylinders as a companion set for a result in place of the standard two commonly required for the 6 in. by 12 in. cylinder. This protocol requirement is not universally accepted, however, and there is compelling research showing the variability may not be as great as originally anticipated.^{vi}

TABLE 2. Frequency Minimums for Concrete Cylinder Strength Testing

Code, certification or standard	Product	Concrete Cylinder Standard	Minimum Cylinder Testing Frequency	Notes
ACI 318	section 5.6.2	ASTM C31; 4x8 or 6x12	One sample per day but not less than 150 cu. yds. Not less than 5,000 sq. ft. of surface area for slabs or walls	<i>Section 5.6.2.4 states a cylinder sample consists of not less than two 6 in. by 12 in. cylinders or three 8 in. by 4 in. cylinders</i>
NPCA Plant Certification	section 5.3.5.4	ASTM C31 for wet cast, ASTM C497 for dry cast; 4x8 or 6x12	4 cylinders for each 150 cu. yds. or 1 week whichever is first	<i>Section 4.6.1 states a manufacturer is required to develop a product specific stripping strength based on compressive testing that is verified quarterly</i>
ASTM C76	Reinforced Concrete Pipe	ASTM C497	5 per day	<i>If acceptance is based on material tests, not 3-edge testing</i>
C478	Precast Concrete Manholes	ASTM C497	5% of total order of product, not greater than 2 per day	<i>If required by owner</i>
C858	Precast Concrete Utility Structures	ASTM C31	None Specified	
C913	Precast Water & Wastewater Structures	ACI 318	To be specified by purchaser	
C915	Precast Concrete Crib Wall	ASTM C31	2 per 10 cu yds., 2 per day min.	
C1227	Precast Concrete Septic Tanks	ACI 318	None Specified	<i>Manufacturer shall certify product meets 4,000 psi minimum design strength</i>
C1417	Precast Concrete Pipe-Direct Design	ASTM C497	5 per day	
C1433	Precast Concrete Box Culvert	ASTM C497	3 per day	
C1504	Precast 3-Sided Structures	ASTM C497	3 per day	
C1577	LRFD Precast Concrete Box Culvert	ASTM C497	3 per day	
C1613	Precast Concrete Grease Interceptors	ACI 318	None specified	<i>Manufacturer shall certify product meets 4,000 psi minimum design strength</i>
C789/C850	Precast Box Culvert	ASTM C497	5 per day	<i>Original box culvert standards replaced by C1433</i>

Concrete cylinder specimen curing

Within the precast industry, there has been some misunderstanding about curing concrete test cylinders by precast concrete plants. ASTM C31 describes two methods of curing concrete cylinders.

The first is described in *section 10.1.3.1 Final Curing Cylinders*, and is described by ASTM C39 to be used when acceptance testing for specified strength, checking adequacy of mixture proportions for strength and quality control. These types of specimens are often described as the “mix potential” of the concrete and are cured in a temperature-controlled water bath for a specified period of time prior to testing. The intent is to eliminate all the variables except the mix properties and batching. Many precasters are not aware this provision permits the use of a moist curing room in place of the water bath. The standard suggests the testing times for these type of cylinders also be uniform and consistent to eliminate another variable. Though this curing method is not required by many specifying agencies for precast concrete products, a precast manufacturer can obtain the concrete mix data that is useful in troubleshooting or process optimization to maintain a uniform frequency of cylinder testing specimens.

The other curing method is the field curing procedure described by ASTM C39. When determining whether a structure is capable of being put into service, this method compares test results of standard cured specimens or with various in-place test methods, adequacy of curing and protection of concrete in structure, and form or shoring removal time requirements. This curing method is often used by specifying agencies and requires cylinders to be cured similarly to the product they represent. After initial curing, if the product is taken out of the plant to the yard, the concrete cylinders go with it. The expectation is the test cylinders will be broken to verify compliance or design minimums prior to installation.

Dry mix concrete cylinder molding

The proper way to cast a cylinder for “zero-slump” concrete or mixes has never been clearly defined by the concrete industry and specifying agencies. The traditional consolidation methods of rodding or internal vibration were deemed inappropriate for these stiff concrete mixes; however, at the time, the use of these dry mix processes was employed by a small segment of the concrete industry. Consequently, the issue was not addressed by the same ASTM C9 Concrete and Concrete Aggregates Committee that developed the C31 standard. It was left to the individual product specifications committees that produced the precast products, which led to a lack of correlation between different product committees on the procedures of dry mix concrete cylinder molding.

For precast concrete products, ASTM Committee C13 Concrete Pipe took it upon itself to clear up the confusion by including a provision within ASTM C497 *Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile. Section 11, Cylinder Strength Test Methods*, removed the wide variety of dry mix mold making from each of the individual material standards. The provision in C497 now describes the specific procedure to make testing cylinders for precast concrete products other than those specified in ASTM C31 when, “the concrete consistency is too stiff for compaction by rodding or internal vibrations.” See Table 1 for compressive strength testing guidelines.

ACI Level I Testing Technician Certification programs do not cover the method to consolidate dry mix concrete cylinders. It is the manufacturer’s job to properly train their concrete QC personnel on the methods described within ASTM C497 to provide consistent and reliable test results.

Frequency of testing

The final item that has confused the industry is the frequency of making and breaking concrete cylinders. The answer lies with many variables including:

- Variable mixes produced per day and cubic yard output
- The minimum requirements within their own unique quality control manual
- Minimums required under any nationally recognized certification program, such as the NPCA Certified Plant Program
- Unique testing requirements of specifying agencies
- Compliance to the requirements stated within a specific material standard seen in Table 2

One or all of these will determine what minimum testing obligation is required of the precast manufacturer.

Concrete cylinder testing is one of the primary methods of specifying agencies and precast product purchasers to verify compliance with specifications and standards. It can also be a valuable tool employed by the precaster to provide a more efficient and economical manufacturing process. The routine task of making and breaking concrete cylinders, and keeping track of endless testing reports and data should be considered a valuable duty rather than a mundane chore. ■

Eric Carleton, P.E., is NPCA’s vice president of Technical Services.

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- ⁱ Concrete, Second Edition by Mindess, Young, and Darwin (section 14.2 Significance of Test, page 365)
- ⁱⁱ Concrete and Concrete-Making Materials ASTM STP169C (Chapter 10 Making and Curing of Concrete Specimens), Klieger and Lamond.
- ⁱⁱⁱ MODOT Research Report 04-005 Comparison of Compressive Strengths Using 4x8 vs. 6x12 Cylinders for Prestress Concrete.
- ^{iv} Variability of 4x8 in. Cylinder Tests: Are three cylinders really necessary?, by Detwiler, Thomas, Stangebye, Urahn, (Concrete International May 2009).

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Fall Protection in Precast Concrete Plants

Don't let the No. 1 OSHA violation
run loose in your plant.

BY EVAN GURLEY

Every year, the U.S. Occupational Safety and Health Administration (OSHA) releases its top 10 most frequently cited violations from the previous fiscal year as compiled by OSHA inspections. OSHA publishes this list to alert employers and employees about commonly cited standards so they can use the information to take preventive measures. Many, if not all, of these frequently cited standards are preventable injuries or illnesses that occur in the workplace.

Year after year, this top 10 list remains basically the same. There may be a reshuffling of violations from year to year, but essentially the layout remains unchanged.

Patrick Kapust, OSHA's deputy director of the Directorate of Enforcement Programs, best described the reason for creating a top 10 list in an interview with the Safety and Health Council.

"The data found in the top 10 list is not meant to gauge how well OSHA is performing or how safe businesses in the country are," Kapust said. "The list is at its best when used by employers as a tool to improve safety at their work sites. Employers who may be interested in what are the possible hazards in their workplaces could look at the top 10 list and see if they're covering all hazards and assessing the kinds of changes they may have to make to their safety and health programs."

OSHA's report for fiscal year 2013 once again cites fall protection as the No. 1 offender. The top 10 most frequently cited OSHA standards and the number of violations are:

1. Fall Protection (1926.501) – 8,241 violations
2. Hazard Communication (1910.1200) – 6,156
3. Scaffolding (1926.451) – 5,423
4. Respiratory Protection (1910.134) – 3,879
5. Electrical, Wiring Methods (1910.305) – 3,452
6. Powered Industrial Trucks (1910.178) – 3,340
7. Ladders (1926.1053) – 3,311
8. Lockout/Tagout (1910.147) – 3,254
9. Electrical, General Requirements (1910.303) – 2,745
10. Machine Guarding (1910.212) – 2,701

The top 10 most frequently cited OSHA standards for fiscal year 2012 were:

1. Fall Protection (1926.501) – 7,250 violations
2. Hazard Communication (1910.1200) – 4,696
3. Scaffolding (1926.451) – 3,814
4. Respiratory Protection (1910.134) – 2,371
5. Ladders (1926.1053) – 2,310
6. Machine Guarding (1910.212) – 2,097
7. Powered Industrial Trucks (1910.178) – 1,993

- 8. **Electrical, Wiring Methods** (1910.305) – 1,744
- 9. **Lockout/Tagout** (1910.147) – 1,572
- 10. **Electrical, General Requirements** (1910.303) – 1,332

OSHA citations from 2012 to 2013 increased by a staggering 45%. While there are no surprises to which violations they are, the top 10 violations for 2013 totaled 42,502 which is 13,323 more than the 2012's tally of 29,179.

Overview of the OSHA Fall Protection Standard

In the U.S. construction industry, falls are the leading cause of worker fatalities. Each year, on average, between 150 and 200 workers are killed and more than 100,000 are injured as a result of falls during construction-related activities.

OSHA recognizes that accidents involving falls are generally complex events involving a variety of factors. Consequently, the standard for fall protection deals with both the human and equipment-related issues protecting workers from fall hazards.

OSHA has revised its construction industry safety standards¹ and developed procedures designed to prevent employees from falling off, onto or through working levels, and to protect employees from being struck by falling objects.

The OSHA fall protection standard outlines when fall protection is required, which systems are appropriate for given situations, the proper construction and installation of safety systems, proper supervision of employees to prevent falls, safe work procedures for workers who use fall protection systems, and training requirements for workers who use fall protection systems.

Duty to have fall protection

When addressing fall protection during construction-related activities, employers are required to:

- Determine if walking/working surfaces have the strength and structural integrity to support employees safely
- Provide working conditions that are free of known dangers

- Keep floors in work areas in clean and, so far as possible, dry conditions
- Select and provide required personal protective equipment at no cost to workers
- Train workers about job hazards in a language they can understand

When fall protection is needed

The use of 100% fall protection at the point of work, as well as going to and from the work area, is mandatory for all employees and all contractor personnel on projects when employees are at risk of falling or working a minimum of 6 ft or more off the floor or ground, except in plant areas covered by OSHA standard 1910.23, Where the minimum distance off the floor or ground is 4 ft. In addition to the 6-ft rule in construction-related activities, other areas or activities where fall protection may be required include, but are not limited to, formwork and reinforcing steel, leading edge work, unprotected sides and edges, precast concrete erection, ramps, walkways, hoist areas and holes in walking surfaces.

Types of fall protection used

All fall protection components and/or systems must conform to the osha standards prescribed in 1926.502. Under the current standards, employers have the choice of selecting fall protection that aligns with the work being performed. Methods to address fall protection include:

- **Elimination or substitution.** For example, eliminate a hazard by lowering the work surface to ground level, or substitute a process, sequence or procedure so that workers no longer approach a fall hazard.
- **Passive fall protection.** Isolate or separate the hazard or work practice from workers through the use of guardrails or by covering exposed floor openings.
- **Fall restraint.** Secure the worker to an anchor using a lanyard short enough to prevent the worker's center of mass from reaching the fall hazard.
- **Fall arrest.** This includes systems designed to stop a worker's fall after a fall has begun.

- **Administrative controls.** These work practices or procedures warn a worker to avoid approaching a fall hazard.

Passive systems are those that do not involve the actions of employees. Examples of passive systems include:

- Guardrails
- Safety nets
- Covers
- Fences
- Barricades

Active systems are systems and components that require manipulation by employees to make them effective in providing protection. Examples of active systems include:

- Anchorage points
- Lanyards
- Snap hooks
- Life lines
- Body harnesses



JENSEN PRECAST WORKERS WEAR FALL PROTECTION GEAR WHILE STANDING ON TOP OF PRECAST CONCRETE FORMS.

OSHA also reiterates that fall protection mechanisms need to be feasible and should not create a greater hazard implementing one or more of the above listed fall protection systems. The employer has the burden of establishing what is appropriate for a particular workplace situation.

Falling objects

OSHA states that employers are required to protect their employees from falling objects. Some methods that may have to be used include:

- Installation of toe boards (at least 3.5 in. wide)
- Building a barricade and restricting entrance
- Installation of screens

Training

Employers must provide training programs that teach employees who might be exposed to fall hazards how to recognize such hazards and how to minimize them.

Employers must prepare a written certification that identifies the employee trained and the date of the training. The employer or trainer must sign the certification record, and retraining must be provided when necessary.

Planning

Careful planning and preparation lay the groundwork for an accident-free workplace. If you are an employer, you are responsible for anticipating fall hazards at your plant and for including fall

protection measures in your day-to-day activities. If you are an employee, you are responsible for following the policies, procedures and training requirements established by your employer.

If falling hazards are present at your plant, plan ahead to eliminate the possibility of a falling accident. Consider these important steps:

Identify all fall hazards that workers are likely to encounter

- Describe how workers will gain access
- Describe how workers will prevent tools and materials from dropping to lower levels
- Establish procedures for inspecting, maintaining, and storing fall protection equipment
- Identify the tasks that expose workers to fall hazards
- Make sure workers use fall protection systems appropriate for their tasks
- Identify areas in which workers may be exposed to falling objects and determine how to control the hazards

- Describe emergency-response procedures for rescuing workers who fall
- Post emergency responder's phone numbers and ensure workers are familiar with them
- Describe all equipment that will be available for rescuing workers who fall

It's not complicated

Fall protection is a broad concept that includes training, procedures, rules, systems and methods intended to protect workers from fall hazards. Fall protection doesn't mean bulky or cumbersome equipment. It doesn't interfere with work tasks, and it doesn't get in the way of co-workers – if you understand the concept and apply it appropriately. ■

Evan Gurley is a technical engineer with NPCA

References:

ⁱ 29 Code of Federal Regulations, Subpart M, Fall Protection, 1926.500, 1926.501, 1926.502 and 1926.503

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Welder's Update

Technology is transforming the welding trade into a more technical and scientific profession, but the welder's environment and requisite tools still demand a high level of safety awareness.

BY SUE McCRAVEN

When acetylene and oxygen from pressurized cylinders meet a spark, a 6,000 F welding torch is created with a flame hot enough to melt through steel. Known as "hot work," welders and pipefitters use regulated torches to cut or fuse pieces of metal. And as high temperatures, an ignition source, potential fumes and job site conditions are linked with the trade, a welding professional requires constant training, skill and safety awareness.

Technology is transforming the welding industry from an art to a technical and scientific trade with improved work conditions, thanks to health and safety regulations. This article is a refresher on safety and welding terms, but cannot cover all OSHA and American Welding Societyⁱ (AWS) regulations and guidelines. According to AWS, the next edition of the Structural Welding Code – Reinforcing Steel D1.4, will be issued in late 2016 or early

2017, so specific code changes won't be known for the next year while the draft is developed.

Precast welding requires constant awareness

With more than 40 AWS Safety & Health Fact Sheets for welders, including everything from burn protection, combustible dust, glove selection, confined spaces, and electrical hazards, plant welders need to regularly review the trade safety rules and regulations.

Welding performed at precast concrete plants includes fabricating metal forms or positioning reinforcement bars and welded wire assemblies. Tack welding of reinforcing bars is not recommended, because it can create "notches" in the bar that decrease the steel's yield strength and compromises the concrete durability.ⁱⁱ All welded splices for reinforced concrete

must conform to AWS D1.4:2005, Structural Welding Code – Reinforcing Steel.

Yet more often, a precast plant welder may be called to fabricate, modify or repair a variety of equipment – forklifts, trucks, hitches, pipes, mixers and, most critically, lifting device welding – a skill requiring certification. Workplace risks grow as welders employ different methods as materials and site conditions vary. For this reason, a welder must be well trained and qualified to work on many materials with a range of tools.

 **To see a more comprehensive list of all AWS Safety & Health Fact Sheets, visit aws.org/technical/facts.**

Welding safety: new OSHA standard

OSHA is preparing to release a new set of HazCom requirements, warnings and safety data sheets for workplaces as part of its new GHS Hazardⁱⁱⁱ Communication Standard. The AWS committee advised the new rule would affect precast concrete plants specifically by proposing to reduce the permissible exposure limit (PEL) to crystalline silica. Crystalline silica dust is a basic component in soil, sand, granite or other minerals. When breathed in, it can cause severe health problems. “This should be the most significant single regulatory-change impact to hit this industry in some time,” said AWS committee members. For more details and deadlines, visit osha.gov/dsg/hazcom/HCSFactsheet.html

Unlocking the jargon

In addition to a myriad of potential hazards and their corresponding safety rules, the welding profession uses numerous acronyms, some of which can cause confusion. AWS members say the biggest acronym confusion is MIG and TIG as opposed to GMAW and GTAW. Here are the five most common acronyms used:

- **SMAW** – Shielded Metal Arc Welding is also known as MMW, Manual Metal Arc Welding, and is one of the most prevalent and versatile types of welding. SMAW is commonly known as “stick welding” and requires more time to accomplish, because the consumable electrode rod (usually steel filler material) requires frequent replacement. The welding rod is coated with flux, and after completing the weld, the slag (residue from the flux) must be removed.
- **MIG** – Metal Inert Gas welding combines two pieces of metal using a consumable wire connected to an electrode current. MIG’s faster welding speed is due to a continuous wire feed passing through the welding gun at the same time as the inert gas. The inert gas protects the electrode from contaminants. MIG is also known as GMAW, and its electric arc can generate very high temperatures – from 6,000 F to 43,000 F.
- **TIG** – Tungsten Inert Gas welding uses nonconsumable tungsten along with an inert gas and is typically used to weld thinner pieces of material together. While TIG welding requires more skill and time to set up, it produces a precise, high-quality weld and generates fewer fumes and sparks. The tungsten electrode provides the electricity, creating a

weld where one part melts into the other. TIG can also use a separate filler material. TIG is also known as GTAW, a process most often used on stainless steel and light metals, and can produce temperatures of up to 35,000 F.

- **FCAW** – Flux Cored Arc Welding uses the flux of the welding wire in the center of the electrode instead of on the outside. This more rapid, expensive welding process uses feed spools and cable rather than stick-welding’s solid rods.
- **SAW** – Submerged Arc Welding uses a continuous wire feed and covers the arc beneath a layer of flux so that no fumes or airborne contaminants are produced. SAW is known for its high productivity – rapid wire deposit rate – and improved working conditions. Because SAW uses a high-quality arc and rapid welding, it is commonly used on large industrial products, such as pressure vessels.

Spot vs. tack welds

As with numerous acronyms, there is also confusion about the difference between “tack” and “spot” welding.

Tack welding is an important first step where the welder deposits separate short beads to properly position, align and secure pieces together using filler material prior to final welding. Tack welds save time and effort in assembly, because if a misalignment or defect is noted, tack welds are easily removed to correct the problem.

Spot welding is the final step, using both pressure and heat – with no filler material – to permanently fuse two pieces together. Spot welding is used mainly on foils or thin materials that have a thickness of a ¼ in. or less. The simplest way to remember the difference between tack and spot welds is tack welds are a preliminary step for positioning and securing pieces for welding, whereas spot welding is the final and permanent join.

Welders earn respect

Skilled welders are responsible for properly assembling, repairing and modifying our industrial equipment and the infrastructure and buildings where we work and live. The welder’s dedication to precision and safety merits the respect of those who work under less arduous conditions.

For this reason, proper ventilation and protective gear – helmets, gloves, cotton clothing and quality eye protection – are critically important. It is exposure to potential toxic, carcinogenic fumes and chemicals, from either the welding gases themselves or from cleaners, paints and sealants used on welding surfaces that pose the greatest threat to welders. ■

Sue McCraven, NPCA technical consultant and Precast Inc. technical editor, is a civil and environmental engineer.

References:

- ⁱ The American Welding Society develops and publishes standards that apply to welding and related disciplines.
- ⁱⁱ See “Hot Topic: Welding Reinforcement” by Claude Goguen, March-April 2011 Precast Inc. magazine
- ⁱⁱⁱ Globally Harmonized System of Classification and Labeling of Chemicals (GHS)



Creating a **STRONG** Corporate Culture

Company loyalty is a two-way street. Here's how to create a corporate culture that keeps your workers on task, engaged and involved for the long term.

BRIDGET McCREA

The numbers are in and the results are both staggering and sobering. According to a recent Gallup survey of 5.4 million working adults, more than half of employees say they are not engaged in their work. An additional 18% of workers describe themselves as “actively disengaged” – a state of mind that can quickly create bad apples that spread their bitterness to co-workers.

Another survey from Careerbuilder.com also paints a dim picture of today's workplace, where 76% of full-time workers, while not actively looking for a new job, would leave their current workplace if the right opportunity came along. Combined, this pool of negative sentiments results in a talent loss of 20 to 50% annually for the average company.

But what if you're not running an average company? What if your manufacturing firm went the extra mile to establish a corporate culture that oozed employee appreciation and was designed to not only recruit the best of the best, but also keep

those workers happily employed for the long term? And as an added benefit, that strong corporate culture would spawn stronger customer and business partner relationships – both of which are vital to precasters operating in today's increasingly competitive market.

Treating everyone like family members

Michael Achenbach understands the value of a strong corporate culture. Since inception, he says the ownership team at Leesport, Pennsylvania-based Reading Precast Inc. has gone out of its way to create a workplace where people actually want to come to work every day. The company started by Achenbach's family 41 years ago boasts an average employee tenure of 15 years, with some exceeding 20 years. He says the 20-employee firm's culture is rooted in a very simple philosophy: “To treat everyone who works here as if he or she were a member of the family.”

As part of that mission, Reading Precast uses a triple-interview process when hiring new employees. "Obviously experience is key, but we also like to look at the individual and at how well he or she will fit in with our corporate culture," says Achenbach. "We operate in a pretty laid back atmosphere around here and that's different for a lot of employees. Not everyone fits into this atmosphere."

Achenbach says the company's culture began to take shape in the late 1980s when his father, who headed up the company at the time, became frustrated with high employee turnover. "At one point, he realized that maybe it wasn't the employees who were the problem; it was something that he was doing," recalls Achenbach. "That's when things started to turn around and when we really began focusing on honing our corporate culture."

Fast-forward to 2014 and Achenbach says former employees are now calling him to get back on the employee roster at Reading Precast. Maybe it's the personalized birthday cakes and associated celebrations managed by Karen Achenbach, Michael's wife and company controller, or perhaps it's the fact that the company's president takes the time to speak one-on-one with every employee as frequently as possible. "Little things like that really add up," said Achenbach, "and it's something that a lot of our workers have never experienced at their previous jobs."

To further cement its corporate culture, Reading Precast also holds monthly meetings with all employees. At those pow-wows – which have been taking place for the last 25 years – the meeting leader reads the firm's mission statement and customer compliments and complaints received during the prior month. The firm's sales manager goes over company sales numbers, profits, order backlogs and "anything else that might be going on at the company (like the purchase of a new truck or office equipment)," Achenbach said. Employees are also given the floor and asked to voice their opinions, criticisms and compliments. "It really makes our employees feel like they're part of something bigger," he notes, "and that their opinions and voices matter."

Achenbach says his ultimate goal is to get all employees thinking like small business owners who have a stake in the company's overall well-being and success. "All

5 STEPS TO SUCCESS

In "5 Steps to Creating Good Company Culture," Samar Birwadker, CEO at HR consultancy Good.Co, says creating a positive company culture takes more than just writing a nice-sounding mission statement. Here are five steps Birwadker says all organizations can take toward creating a more positive company culture:

- 1. Embed values in everything.** Your company's core values should be clear and communicated in every aspect of the business. When a staff member makes a decision, he or she should know what's ultimately important to the company.
- 2. Recruit and hire to fit.** When your company's culture is clear, it becomes easier to find new staff that will fit in and become productive members of the team.
- 3. Be clear about expectations.** New hires should be able to quickly and easily understand what is expected within the company culture – from why you do what you do, to how they should present themselves to clients, and how they should interact with colleagues.
- 4. Follow through.** Paying attention to both the visible and invisible aspects of your company's culture is important. If something is heading off course, quickly redirect it.
- 5. Start from the top.** The best way to establish and maintain a strong culture is for leadership to live it. If your company's leaders are doing the exact opposite of what's expected, it will become difficult to convince employees to follow a different set of guidelines.

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CORPORATE CULTURE DOs and DON'Ts

David Carmell, president at C-Suite Advantage business advisory firm in Chicago, offers these key do's and don'ts of establishing a corporate culture for your precast manufacturing firm.

DOs:

- 1. Use clarity.** A critical key to building a great culture is never losing sight that, without clarity in outcomes and purpose, there can be no real accountability and, hence, great culture. Leaders should start with a clear vision or mantra that everyone can embrace and remember – not only with financial objectives, budgets and time frames, but also with specific results and accountabilities that team members own, celebrate and are rewarded upon. “It is imperative that all members pull in the same direction and are on the same page,” Carmell said.
- 2. Be relevant.** Successful business leaders recognize and embrace that their business – and to a larger extent their business model and culture – is a reflection of themselves (ownership) and that no business, nor business model or culture is immune from obsolescence and irrelevance. That’s why businesses with extrinsic cultures emphasize not “What’s in it for me?” but “How my decisions and actions will affect others,” which eliminates destructive behavior and clears the way for excellence and sustainability to spread. “In other words, you must recognize that if you want a sustainable business, you do so by building talent and a resonating culture with ingrained ethics,” Carmell said. Sustainable (family) businesses win by staying relevant through continually questioning and challenging the status quo and conventional wisdom. Ask yourself: Is an idea, policy or plan worthy of preserving, spreading or offering as a promise of a better future?
- 3. Keep your eyes open.** According to Carmell, the majority of businesses fail not because they lacked vision, but because they failed to remain relevant or their culture had a fatal flaw of lacking in organizational engagement. Some of the biggest challenges to building a great culture remain:

- The ability to bridge the gap between strategy and results
- Aligning, energizing and enabling both family and organization to follow through on the strategic roadmap
- Needing help in making better decisions through input and support from others
- Embracing outside input
- Coming clean on points of pain, potential blind spots and problems of consequence

DON'Ts:

- 1. Don't allow bias and ego.** Do not allow ego to dilute yourself, your organization or your team. Do not allow self-serving, delusional bias to pervade the culture and decision-making. “Unless proven otherwise,” said Carmell, “leaders must assume they are not already changed or are the epitome of change.” If leaders do not recognize this, he adds, then despite the best of intentions, nothing significant will change.
- 2. Don't be afraid of resistance.** Expect and welcome resistance. Leaders and family alike need to be clear on what is at stake; anticipate, understand and then manage the resistance. Define the critical path to stakeholder buy-in.
- 3. Don't rely on the faceless boss syndrome.** “If the troops cannot identify, see or know the ones they serve, then even the best-laid plans will fail due to lack of accountability,” Carmell said. If the troops do not know whom they are playing for (the “Wizard of Oz” syndrome), then why should they be or feel accountable? Family members and leaders need to recognize that their job is not over once the decision is made, he adds, so be visible and stand behind it.

“Lastly, businesses that combine innovative thinking and strategy with aggressive planning and execution,” says Carmell, “will deliver magnetic leaders, teams, cultures and solutions that others are drawn to and will firmly stand behind, both now and in the future.”

employees owe it to themselves to get out there and sell their services for a company that will appreciate them and take care of them,” Achenbach said. “Our 15-year average tenure proves that things must be pretty good here, and I feel great about that.”

Reaping the rewards

According to Daniel Paulson, CEO at InVision Business Development in Madison, Wisconsin, the most effective corporate culture initiatives start at the top of the corporation and move down through the entire organization – right to the frontline staff. Paulson, who recently helped a second-generation, family-run cast stone manufacturer strengthen its leadership teams and build on an already effective business culture, said frontline staff is often the most important component of an effective corporate culture.

“In a precast plant, those frontline workers are most worried about building the next widget, and even their managers don’t always understand concepts like business direction and culture,” Paulson points out. The cast stone manufacturer, for example, was dealing with a number of redundant systems and processes that had been instituted over time but never actually assessed in their entirety. With an eye on improving efficiencies, the company broke down its bid process to ferret out points of delay – and wound up reducing its bidding system to two days from one week – and worked with teams in the plant to lower error rates and manufacture better products.

“A lot of the improvements were a result of working with management teams to communicate to the frontline workers on what they were doing, how they were doing it and looking

for better solutions,” said Paulson, who sees continuous improvement as a necessary component for a strong corporate culture and for ongoing profitability and success. “A lot of companies assume that they’re at the top of their games and/or the best in their industries, when in fact that’s not always the case.”

Precasters who take the time to develop and hone their corporate cultures can expect numerous benefits in return. Paulson cites lower employee turnover, increased sales and higher profitability as just three of the key rewards that most companies achieve over time. And while those benefits may not appear overnight, Paulson assures precasters that the rewards will become evident as time passes. “Usually there is a slight lag time before companies begin seeing the advantages of a strong corporate culture,” he notes, “but as you start to improve your culture and as employees and managers buy into those improvements, the positive results will show up.”

Don't fight a losing battle

At Western Precast in El Paso, Texas, all employees are treated equally – whether they’ve worked for the company for 10 years or one day. And even though the company has staff members who have been on board for two or three decades, Leo Feuerstein, operations manager, says the company’s owners work hard to create an atmosphere of equality as part of their core corporate culture. “No one is more important than the next person,” said Feuerstein, whose management team applies that philosophy when recruiting and selecting new hires. “We know that they won’t always last,” he admits, “but we try to make every newcomer feel as though they play an important role from day one.”

Feuerstein says Western Precast’s corporate culture has been in place for more than 30 years and that the company is continually honing that culture to make sure it remains relevant and useful. “We’re always trying to improve upon it,” he said. As part of that culture, the company distributes cards containing personalized notes from the firm’s owners and \$25 checks on employee birthdays; gym memberships for staff members and their immediate family; life insurance policies; and a health maintenance program. Western Precast also offers a week of vacation and five personal days annually for workers who have been on the payroll for over a year, and free psychological counseling for stress-related job or family situations.

Having grown from just six employees to 50-plus over the last three decades, Western Precast operates on the core value that if you want to achieve profits and build quality products, you have to treat all individuals equally and with respect. “Ignore that human element and the odds that you’ll have a profitable firm and/or quality products will be pretty slim,” said Feuerstein. “You’ll basically be fighting a losing battle.” ■

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

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THE
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BY SUE McCRAVEN

**EXCEPTIONAL ARCHITECTURAL PRECAST CONCRETE DESIGNS REFLECT
INNOVATION, HISTORY AND CULTURE FOUND AROUND THE WORLD.**



DREAMSCAPE: LOUISIANA STATE MUSEUM & HALL OF FAME, NATCHITOCHES

Architect: Trahan

Precaster: Advanced Architectural Stone

Engineer: LBYD

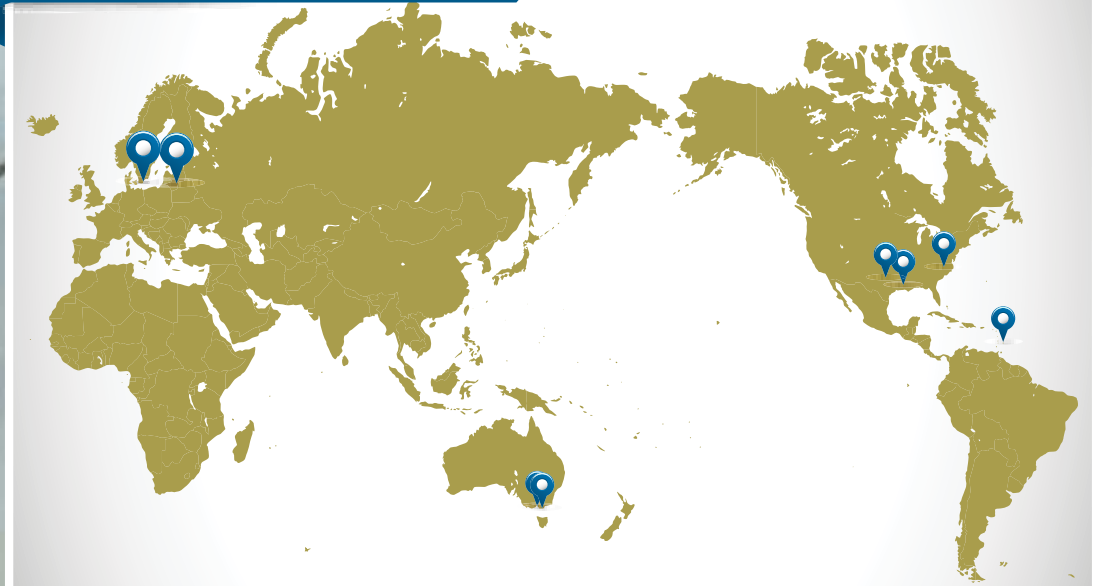
Completed: 2013

The fluid, soothing design found at Louisiana's State Museum and Sports Hall of Fame may place a visitor into a dreamlike state as they walk the winding halls and corridors. The museum overlooking historic Cane River Lake captures shapes and textures that emulate Natchitoches' local terrain and winding rivers, fusing two seemingly incompatible venues — sports and history — with exceptional design. According to Trahan Architects, the site greatly influenced the interior design. The "fluid shapes" of the corridors, or "river channels," are separated by structures, or "masses of land."

Advanced Architectural Stone created more than 1,150 precast concrete panels that are supported by a custom structural steel frame beneath.

Photo courtesy of Advanced Architectural Stone

PRECAST PROFILE LOCATION MAP





A SLANTED VIEW: BELLA SKY HOTEL, COPENHAGEN, DENMARK

Architect: 3XN

Engineer: Rambøll

Consulting Engineers (M&E): EKJ

Contractor: NCC

Precaster: Contiga Tinglev

Size: 452,000 sq ft, 23 floors

Completed: 2011

Scandinavia's largest hotel, Bella Sky, adds modern elegance to Copenhagen, Denmark's capital city, and was designed as the perfect world-class structure for the trending neighborhood of Ørestad. "We have knowingly worked towards designing a building unlike anything else in Copenhagen — and we did that because Ørestad, which is a new city neighborhood, is also unlike any other place in Copenhagen," said Kim Herforth Nielson, principal and founder of 3XN, project architects. "Bella Sky is designed specifically to reflect the identity of Ørestad."

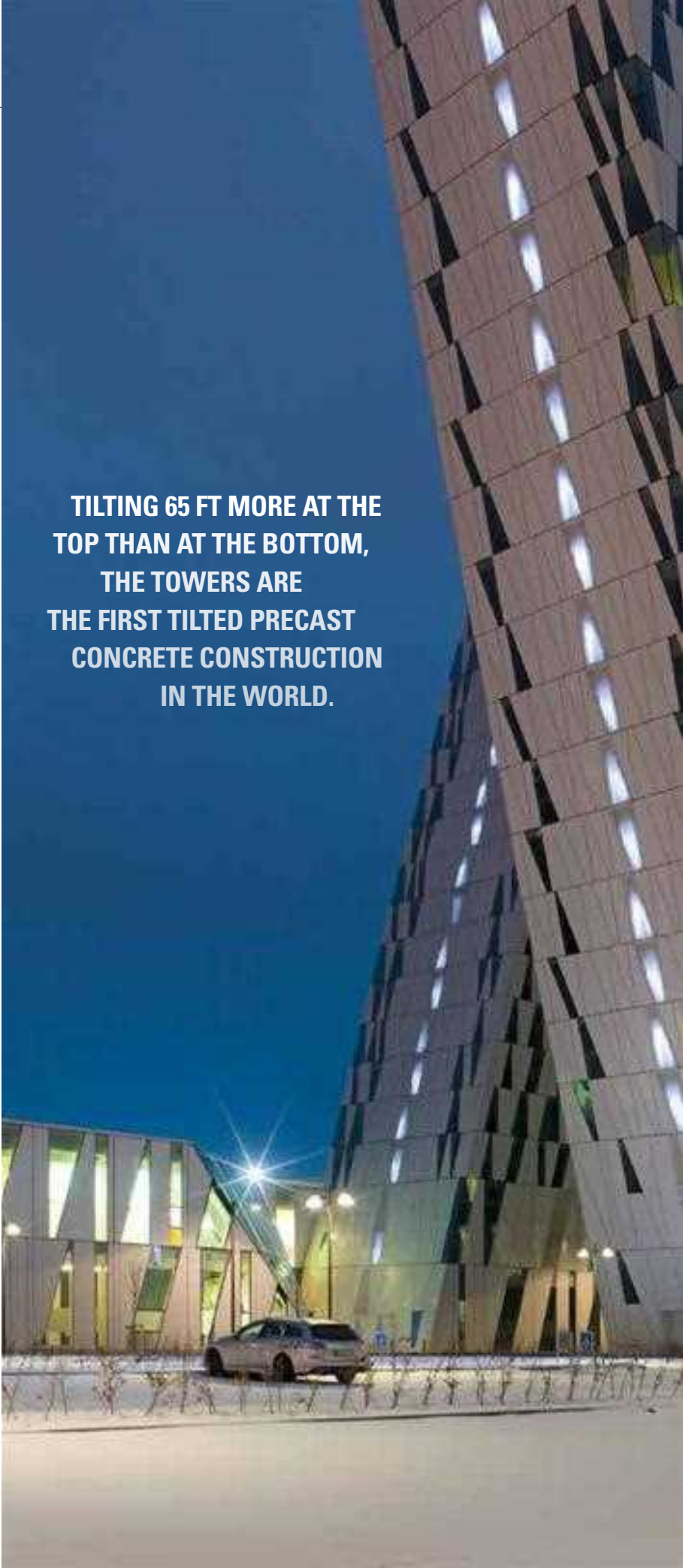
3XN designed Bella Sky's two towers to twist apart (the south tower twists at the top, while the north tower twists at the bottom), a daring architectural approach. "The effect of the leaning towers has also resulted in corner rooms where the building angles create a view which is actually underneath the room!" said Nielsen. "It gives the illusion of floating above the view itself."

In addition, one tower twists outward by 19.2 degrees, making the 250-ft structure appear to contort in the wind. Located near the Copenhagen Airport, the hotel could not be designed as one tall tower due to flight safety regulations. Aluminum and glass façade panels cover the precast concrete building, which includes hollow-core slabs, beams and internal columns.¹

"Abroad, a building such as Bella Hotel would normally be built using in-situ concrete or steel," said Kaare K.B. Dahl, project engineer at Rambøll. "But in Denmark we have a tradition of using precast concrete units. It is cost-effective, results in fewer flaws in the individual units and is far more comfortable to work with."

The Danish Precast Concrete Association (DPCA) is proud of the Bella Sky Hotel. "Bella Sky is not only an icon for precast," said Poul Erik Hjorth, director of DPCA. "It also has moved the limits for precast. When you can design and construct such a building with concrete elements — you can use precast solutions everywhere."

Bella Sky Hotel recently received the 2014 fib award for Outstanding Concrete Structure from the International Federation for Structural Concrete.



**TILTING 65 FT MORE AT THE
TOP THAN AT THE BOTTOM,
THE TOWERS ARE
THE FIRST TILTED PRECAST
CONCRETE CONSTRUCTION
IN THE WORLD.**

Photo courtesy of 3XN



**LINKING HISTORY: GRAPEVINE CONVENTION
& VISITORS BUREAU, TEXAS**

Contractor: Byrne Construction Services

Architect: ARCHITEXAS Inc.

Precaster: Advanced Architectural Stone

Mason Contractor: Clay Hunt / J & E Masonry

Completion: 2012

The City of Grapevine, Texas, a community just northwest of Dallas, grew in prosperity when the railroad linked the city with Dallas. To maintain the rich and deep history of the town as a transportation hub, the convention and visitor's bureau has preserved the old railroad hotel façade architecture in its new building.

According to Advanced Architectural Stone (AAS), the specs for the center called for a series of storefronts that would mimic the rustic style of the Old West found in the 1800s. Cast stone copings, pier caps and water tablesⁱⁱ all were formed using a grapevine motif that is similar to the original wooden façades.

With its detailing work, AAS's achievement of exceptional architectural intricacy for the building won many industry accolades and more including the 2012 Architectural Precast Association Award of Excellence – Design & Manufacturing & Craftsmanship, and the Construction Specifications Institute Award for Manufacturing & Design Excellence.



Photo courtesy of Advanced Architectural Stone



HONORING OUR VETERANS

BY THOMAS SAYRE

www.thomassayre.com | www.clearscapes.com



Courtesy of Jim Sink Photography

HITTING HOME: GARNER VETERANS MEMORIAL, NORTH CAROLINA

Architecture: Clearscapes

Artist: Thomas Sayre

Precaster: Lucas Concrete Products Inc.

Completed: 2013

More boys and young men from North Carolina fought and died in the American Civil War than from any other state in the Confederacy. The local veterans association in Garner, North Carolina, wanted to honor the ultimate sacrifice of all local soldiers lost in conflicts in a memorial that would give visitors an emotional connection with the fallen warriors. Garner Veterans Memorial's architecture design achieves the shared objective.

The Architectural Precast Association awarded the memorial the APA Design & Manufacturing Excellence Award in 2013. "This really wowed us," jury members said.

The following is Clearscapes artist Thomas Sayre's detailed explanation of the design process.

The Garner Veterans Memorial is the result of a competition to create a place of both education and remembrance to honor the veterans of Garner, North Carolina. Individual bands of precast concrete and stone establish walls representing conflict, while benches offer peace marking 24 decades of our nation's past and the series of conflicts that have brought us to today.

Each of the 37 precast concrete wall panels was individually molded and poured utilizing an "earthcasting" technique. Clay is broken into clods and the soil is packed into molds to create the texture of broken ground, the soil of the plowed field — or the exploded surface of warfare. The concrete was then pigmented with iron oxide to match the red clay soil. The surface of the earthcast panels protects the memorial's smooth inner granite panels, where each conflict is described with the names of the fallen from Garner.





CARIBBEAN FLAVOR: PORT FERDINAND LUXURY RESORT, BARBADOS, WEST INDIES

Precaster: Preconco LTD

General Contractor: Jada Builders

Current Architect: Michael Gomes Architects

Completed: Phase I completed in 2013, Phase II currently under construction, 2014

Port Ferdinand Marina and Luxury Condominium Resort is an exclusive residential resort set on 16 acres of land just north of historic Speightstown, Barbados. The resort marina features 120 yacht berths and 83 luxury homes, each with captivating views of the breathtaking Caribbean Sea and a horseshoe-shaped marina.

Preconco Limited, an NPCA member located in Lears Quarry, Lears, St. Michael, manufactured and installed all the precast and prestressed concrete components for the resort's all-precast concrete superstructure core and shell. The "Cross Wall" construction method uses precision-engineered and factory precast concrete custom components for a more modern and effective building approach.

"After first getting our feet wet with the Port St. Charles Marina in Barbados (over 10 years ago) and again in St. Lucia with The Landings Resort & Residences, we were thrilled with the opportunity to be involved with the development of the Port Ferdinand Luxury Resort & Marina," Mark Maloney, Preconco Limited CEO, said.

"Given the design and architectural flair of this luxury property, precast was the obvious choice for this project. Precast concrete is an efficient, cost-effective product, which allows for flexibility in design, speedy installations and high quality structures. We are proud to have had the opportunity to highlight precast concrete through the construction of this world-class project."

Photos by Reve Graham, Group Marketing and PR Coordinator



**CELLULAR ARCHITECTURE: LA TROBE
INSTITUTE FOR MOLECULAR SCIENCE,
AUSTRALIA**

Architect: Lyons

Builder: Watpak Construction

Engineer: Meinhardt

Precaster: Advanced Precast

Size: 118,000 sq ft

Completed: 2013

The design by Lyons, an architecture firm in Melbourne, Australia, for the new La Trobe Institute of Molecular Science in Victoria, Australia, is bursting the bonds of typical campus structure geometry.

According to architect Carey Lyon, “The campus master plan dates back to 1968 and the objective was clear – the design of this new building is to break the mold belonging to the decades of the 60s and 70s. Obviously, we gave the façade a visual metaphor for cell research.”

From the 200-mm thick precast external wall, hexagonal precast concrete cells blast out of the structure’s façade to starkly symbolize cell research. And the façade is made all the more dramatic and daring with the use of vibrant colors and wood finishes. Notice that the hexagons are positioned randomly and even offer spaces for students and classes to meet.



Photo courtesy of Nick Hoogenraad, Director of La Trobe Institute for Molecular Science

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41X: AUSTRALIAN INSTITUTE OF ARCHITECTURE VICTORIA CHAPTER

Architect: Lyons

Contractor: Hickory Group

Precaster: Euro Cast

Engineer: Winward Structures

Size: 307,000 sq ft, 22 floors

Completed: 2014

Developed by the Australian Institute of Architects, Institute 41X is a 22-level, Five Star Green Star strata-titled tower that sits on a small footprint of about 300 sq ft. 41X targets carbon neutrality over its 30-year lifespan — accounting for embodied energy, base building operational energy, transport and waste.

Besides the Institute, 41X offers a rooftop terrace and is home to retail operations, including a café and bookstore. A striking sculptural precast concrete exterior forms a stairway design that, according to Adrian Stanic, director of Lyons Architects, “explores the idea of joining together a public and commercial building by connecting the city street space with the Institute’s occupied levels.”



Photo courtesy of the Australian Institute of Architects

THE INTERIOR DESIGN IN PARTICULAR IS WELL SUITED FOR ARCHITECTURAL PRECAST CONCRETE – A STRUCTURAL MEDIUM THAT POSSESSES THE FLUIDITY REQUIRED FOR SEAMLESS CONTOURED DESIGNS.



INTERGALACTIC DESIGN: PROPOSED GUGGENHEIM HERMITAGE MUSEUM, VILNIUS, LITHUANIA

Architect: Zaha Hadid

Project Architects: Thomas Vietzke and Jens Borstelmann

Engineer: AKT

Size: 140,000 sq ft

Zaha Hadid Architects used the latest digital and fabrication technology in its proposed design of the Guggenheim Hermitage Museum in Vilnius, Lithuania. According to the architect, the structure “appears like a mystical floating object that seemingly defies gravity. Curvilinear lines echo the elongated contours of the building, offering an enigmatic presence that contrasts with the vertical skyline of Vilnius’ business district.”

The interior design in particular is well suited for architectural precast concrete – a structural medium that possesses the fluidity required for seamless contoured designs. This futuristic architecture was chosen as the winner in a 2008 international design competition as judged by a panel

Renderings courtesy of David Gordan, Zaha Hadid Architects



that included the Guggenheim Hermitage director, Mikhail Piotrovsky and Guggenheim Foundation director, Thomas Krens. If built, the estimated cost of the structure is approximately \$80 million. ⁱⁱ

Sue McCraven, freelance writer and NPCA technical consultant, is a construction engineer and environmental scientist.

References:

ⁱ More than 7,000 precast elements were used in the main structural system. See the precast structural model for Bella Sky on the NPCA website at precast.org.

ⁱⁱ In masonry architecture, a water table deflects water from running down the building’s face or to the foundation.



DAMP PROOFING vs. WATERPROOFING

Part 3: Applications requiring additional chemical resistance

BY TIM FRAZIER

Editor's Note: This is the last installment of a three-part series. In the previous issue of *Precast Inc.*, we examined industry standards associated with concrete preparation prior to coating. In this article, we examine how concrete degradation can occur and review applications used for protection.

Concrete is an incredibly strong and durable building material, and the quality control measures involved with precast concrete only accentuate those characteristics. But, like every other building material, concrete is not invincible. A high quality precast product – with low permeability and a dense matrix – paired with a protective coating, however, will remain protected from detrimental elements and provide the long service life owners have come to love. Before applying a protective coating, though, it's important to understand the significant areas where concrete degradation can be expected and how to best protect your product.

Reviewed here are four common mechanisms of degradation.

Acidic reactions

When concrete is first hydrated, its pH is 12.5 or higher. Exposed to an acid source, with a pH below 7.0, the cement

components dissolve and form chloride, sulfate and/or nitrate salts. As the cement paste continues to dissolve, coarse aggregate is exposed which leads to reduced strength and greater porosity. This process continues as fresh concrete surfaces are exposed to more acid – leading to more concrete degradation. Acid resistant types of cement help, but no concrete can resist sustained exposure to flowing acidic conditions indefinitely. It should be noted that pH values do not always correlate to the aggressiveness of an acidic solution in regard to its ability to dissolve cement paste. The aggressiveness of the acid depends on the solubility of the calcium salts formed when the acid reacts with calcium hydroxide. The higher the solubility of the resulting calcium salt, the greater the acidic attack on cement.

Prolonged exposure to acid manifests itself as rust bleeding from corroding reinforcing steel, cracking, exposed coarse aggregate, spalling and a highly weakened concrete matrix.

Alkaline reactions

Fresh concrete, with a pH between 12-14, is typically unaffected by alkaline solutions unless the solutions are hot. Under sustained exposure, a hot 25% solution of sodium hydroxide may slowly degrade concrete over time and the same is true for hot potassium hydroxide. Under such conditions, the concrete undergoes destructive alkali-silica reactions (ASR). To enhance resistance, use aggregates low in reactive forms of silica, testing them to ASTM C289.

Chloride induced deterioration

When concrete is placed around reinforcing steel bars, the steel surface initially corrodes, forming a tightly adherent oxide film over the surface to provide protection from further corrosion. The highly alkaline environment maintains this protective film provided it remains free from exposure to moisture, oxygen and chloride ions. If exposed to those elements, the result is the formation of large amounts of iron oxide (rust) being generated from the steel with concurrent expansion. When these expansive forces exceed the tensile strength of concrete, concrete cracks develop. Cracks further perpetuate the cycle and further degradation occurs. Rust bleeding, cracking and spalling are all signs of chloride-induced corrosion.

Sulfate deterioration

Both naturally occurring and manufactured sulfate products can attack concrete. Such an attack can occur when concrete is in contact with sulfate containing water (seawater, swamp water, groundwater or sewage water). Their exposure to concrete structures causes extremely destructive reactions with hydrated portland cement paste. Over time, if evaporation cycles occur, sulfate concentration increases and cause microcracking, then larger cracking and concrete matrix disintegration. Sulfate attack usually occurs in two stages:

1. Sulfate ions react with calcium ions in the cement paste forming calcium sulfate (gypsum).
2. Gypsum and calcium aluminates form calcium sulfoaluminates (ettringite).

CHEMICAL AND SECONDARY CONTAINMENT PROTECTION

Industrial storage holding tanks and wastewater structures associated with chemical and agricultural industries is another area prone to concrete degradation. The following is a list of industries that have concrete degradation exposure:

Food and Beverage Industry	Lactic acid exposure from milk products Citric acid exposure from fruit decomposition Acid exposure from wine making operations
Power Utilities	Sulfuric acid exposure from oxidized sulfur gasses
Oil and Petrochemical	Hydrogen sulfide, sulfuric acid
Industrial Wastewater	Sulfuric and hydrochloric acid
Chemical Manufacturing	Various chemical and acid exposure

In other instances, the chemical may fall into a previous classification and may cause concrete deterioration requiring a protective coating. The chemical may not be detrimental to concrete, but to limit environmental exposure, a coating is applied to contain it. Government regulations, regarding containment of hazardous chemicals, have made it mandatory to coat or line containment systems that have the potential to reach the soil or groundwater.

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A UTILITY VAULT WITH A WATERPROOF COATING IS LOWERED INTO PLACE ON GEORGIA STREET IN DOWNTOWN INDIANAPOLIS.

Both reactions cause cracking and disintegration. When concrete is frequently exposed to sulfates in an environment of cyclic wetting and drying, the concentration of destructive sulfates increases sufficiently to cause rapid concrete deterioration.

Coating considerations and types

Protective barrier coatings are primarily used to protect concrete surfaces from chemical attack, and the entrance of liquids and gases. The coating must be alkaline compatible, and must resist the chemical it will be exposed to. Alkali resistance in coatings has become increasingly important because fast track construction often will not permit a 28-day cure prior to coating.

Understanding and defining actual exposure conditions – chemical type and concentration, duration and type of exposure, wet/dry cycling, and temperature – is critical in selecting the proper coating system. Chemical resistance is a function of molecular weight or crosslink density. Chemical resistance is typically greater with increasing crosslink density. However, flexibility can be lost in the gain for increased chemical resistance.

The three most often used generic coating types include:

- **Epoxies** – Epoxies are two-component systems consisting of an epoxy resin and a curing agent and are known to have good resistance to alkalis and organic acid. The cure rate of epoxies is affected by temperature and should not be applied below 40 F. Many cured epoxies soften above 150 F and are not resistant to ultraviolet light (UV). Epoxy novolacs have a greater crosslink density and an excellent all around resistance to alkalis, acids and solvents. The downside to having a higher crosslink density is they are more viscous, making application more difficult.

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• **Urethanes** – There are two general types of urethane coatings: two-component and moisture cure. Mixing a polyisocyanate and a polyol creates a two-component urethane. Moisture-cure polyurethanes are one-component systems that cure by reacting with moisture in the environment. Two-component systems have a greater crosslink density and barrier properties; however, moisture-cure polyurethanes are still widely used since they perform well and offer the convenience of a one-component system. Urethanes perform best when applied on dry concrete as water can interfere with cure and film formation.

• **Acrylics** – Acrylic coatings will not attain the crosslink density of epoxies or urethanes but do offer chemical resistance in many situations. They are UV resistant and are available in lower volatile organic compound content (VOC) than alternative systems. In recent years, self-crosslinking acrylic coatings have emerged within the acrylic family, which provide a higher degree of crosslinking and improved resistance properties.

Other protective coating options include:

- Polyureas
- Polyaspartics
- Polymer fortified concrete overlays
- Polyesters and vinyl esters

Coatings are not a guarantee of 100% success in protecting from detrimental elements. However, coatings significantly reduce the contact between the concrete and potentially damaging substances. Coatings used to protect concrete against water and aqueous chemical solutions should have a very low water transmission rate (MVT). This is particularly true for immersion grade coatings or secondary containment coatings. ASTM E96, Test methods for Water-Vapor Transmission of Materials, gives one such way of evaluating coating permeability. ■

Tim Frazier is technical director of Concrete Sealants Inc. He has been involved with coating-related products for 27 years and with concrete coatings for the past 20 years. Frazier holds a bachelor's degree in chemistry from Wilmington College, and a master's degree in chemistry from Wright State University.

Resources:

- ICRI Guideline No. 03732. *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays*; ICRI: Sterling, VA.
- Hooker, K.A., *Epoxy and Urethane Coatings*. *Concrete Repair Digest*, April/May 1992.
- Randy Nixon, *The Fundamentals of Cleaning and Coating Concrete*, SSPC: The Society for Protective Coatings, Pittsburgh, PA.

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Sustainability Awards

Recognizing Excellence in a Growing Industry Segment

BY CLAUDE GOGUEN, P.E., LEED AP

On a warm spring day in 2008, the NPCA Board of Directors joined to discuss the growth of the association and precast concrete industry. One topic all members present touched on was sustainability, so a task force was assigned the job of leading the association through uncharted waters.

Much has happened since that spring day. The task force is now known as the Sustainability Committee, a Life Cycle Analysis (LCA) of precast concrete was commissioned and completed, NPCA members use a LEED calculator and other documentation to help designers obtain LEED points and educational courses are taught at NPCA events. And to spotlight companies who adopted sustainable practices and recognize the associated benefits, the NPCA Sustainability Awards were formed in 2012.

Here is the list of The 2013 Sustainability Award winners. The awards are divided into four categories: producer plant, producer project, associate plant, and associate product.

 To see complete descriptions of the winning projects and honorable mentions, visit precast.org/awards.

PRODUCER DIVISION

FIRST PLACE PROJECT

Company: Smith Midland Corporation – Midland, Virginia

Project: Nelson Harvey Facility, Johns Hopkins Medicine Campus

Location: Baltimore, Maryland

After decades of wear, the hand-laid brick envelope of the nine-story Nelson Harvey facility on the Johns Hopkins Medicine Campus in Baltimore began failing. Architects needed a solution

that met two criteria: a system lightweight enough to prevent any need for additional superstructure or foundation costs, and the facility needed to stay operational during the exterior renovation.

The Smith-Midland SLENDERWALL system met both requirements by allowing for the recladding to take place without removing the old fascia. The project included 158 SLENDERWALL panels with an Endicott brick facing, maintaining continuity with the original exterior. Smith-Midland also applied its closed-cell "H2Oout" foam insulation sealant to the panels.

These options will provide savings in time and on-site trades, and insurance against air and water infiltrations. The project is to be certified under Baltimore City's Green Stars Program, which is an equivalent to LEED silver.

FIRST PLACE PLANT

Company: Shea Concrete Products – Amesbury, Massachusetts

Project: Solar Power Panels on Precast Plant

Location: Amesbury, Massachusetts

Shea Concrete went solar in the summer of 2013. The Shea facility in Amesbury powered up on Aug. 30 with a new, American-made, \$1.4 million solar panel system installed on the roof of the plant. The 1,184 SunPower solar panels will produce an estimated 421,000 kw-hours per year. This makes Shea Concrete a Net-Zero electrical energy consumer, meaning that the solar panel system generates enough electricity to fully power the Amesbury location without



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SOLAR PANELS AT SHEA CONCRETE PRODUCTS

requiring any additional sources of electricity. The panels, which are American Recovery and Reinvestment Act (ARRA)-compliant, harvest an output that is on average 7% better than other panels annually and 20% more productive over the 25-year life of the system.

HONORABLE MENTION – PRODUCER PROJECT

Company: Northeast Precast LLC – Millville, New Jersey
Project: Bimbo Bakeries – Thin Wall Panels
Location: New York, New York

The project saw integration of architectural and structural design into a lightweight sustainable panel system made up of sandwich and solid panels. The owners saw the advantages of this system with the elimination of the outermost steel columns, insulation value, additional square footage and the enhanced life cycle of the building.

HONORABLE MENTION – PRODUCER PROJECT

Company: Northeast Precast LLC – Millville, New Jersey
Project: Boardwalk Casino and Townhouses
Location: Sea Isle City, New Jersey

This was a total precast sustainable solution for post-Sandy construction on the Jersey shore. This project was made up of sandwich panels, solid panels, NEP floor plank, columns, precast elevator shafts, inverted tee beams, double tees and other custom precast shapes and sizes. This building will not only be energy efficient and durable, but also resilient in the face of storms in the future.

HONORABLE MENTION – PRODUCER PLANT

Company: Reading Rock Inc. – Cincinnati, Ohio
Project: Concrete Recycling Process
Location: Cincinnati, Ohio

Today, recycling concrete by “crushing” the material is part of Reading Rock, Inc.’s manufacturing process. However, nearly five years ago, trucks would haul the waste to a local dump site, which was costly and not environmentally responsible. In 2009,

Reading Rock purchased a crusher to allow concrete materials to be ground down for reuse. In just over 36 months, Reading Rock saw a return on investment and has continued to see positive results over the past several years.

ASSOCIATE CATEGORY

FIRST PLACE PRODUCT

Company: The Euclid Chemical Company – Cleveland, Ohio
Product: Tuf-Strand SF Macro-Synthetic Fibers
Location: Cleveland, Ohio

The building sector is a major contributor to the carbon dioxide footprint in any developed community. One way scientists refer to this footprint is by describing carbon dioxide equivalents or CO₂eq.

An important way to decrease the CO₂eq associated with building practices is to use materials that have a smaller carbon footprint. Polypropylene fiber reinforced concrete (PFRC) is

a versatile and high-performance material suited for concrete construction. The Euclid Chemical Co. recently partnered with the University of Akron in a research study to establish the benefits and potential reduction of CO₂eq when using TUF-STRAND SF macro-synthetic fibers in concrete.



TUF-STRAND SF MACRO-SYNTHETIC FIBERS

The results of the study indicated that the use of polypropylene fibers reduced the CO₂eq emissions by 56% compared with steel reinforcement. This analysis can be carried over to applications within the precast concrete industry to help reduce CO₂eq.

FIRST PLACE PLANT

Company: The Euclid Chemical Company – Cleveland, Ohio
Product: Tuf-Strand SF Macro-Synthetic Fibers
Location: Cleveland, Ohio

The Euclid Chemical Co. continues to recognize that sustainability drives company success and employee satisfaction. Over the past several years, multiple projects have been deployed at Euclid’s manufacturing facilities throughout North America to improve metrics on waste management, energy consumption, water use and safety. These initiatives are communicated to the company’s employees and customers to demonstrate its commitment to being a good neighbor and a



EUCLID CHEMICAL COMPANY

respected business partner. Recognizing that sustainability is a process, Euclid promotes the foundational values of “people, plant and prosperity,” where the social, environmental and economic factors of day-to-day business are blended into the global and political arena. The company has instituted a variety of programs to trim waste and curb energy use and established a Sustainability Leadership Team to track energy consumption and improve efficiency at its plants.

HONORABLE MENTION – ASSOCIATE PRODUCT

Company: W.R.. Grace – Cambridge, Massachusetts

Product: Airtrac Air Management Technology

Sustainable structures must be durable, and it is well established that freeze-thaw durable concrete requires proper levels of entrained air, but high variability of air content batch

is a vexing quality control problem. AIRtrac, a breakthrough technology, allows a step change in the ability to keep air levels within specified limits while saving time vs current practice.

HONORABLE MENTION – ASSOCIATE PRODUCT

Company: Hamilton Kent, LLC – Toronto, Ontario

Product: Watertight Box Culvert Joints

A total of 256 pieces of box culvert made by American Concrete will eliminate CSO discharges to the Kennebec River and Bond Brook. The watertight box culvert joints were sealed with the Tylox Super Seal rubber gasket manufactured by Hamilton Kent LLC. This will keep wastewater out of environmentally sensitive areas, and significantly reduces the amount of storm water entering the wastewater treatment plants.

HONORABLE MENTION – ASSOCIATE PLANT

Company: Hamilton Form Company – Forth Worth, Texas

Product: Improving Sustainable Manufacturing Processes

Hamilton Form began developing a more sustainable facility and manufacturing processes in 2009. The efforts include an insulated and coated roof skylight, roof fans and energy efficient lighting. In addition, the company began recycling steel, paper, bottles and cans.

If you are interested in submitting an application for the 2015 Sustainability Awards. Please go contact Claude Goguen, Director of Sustainability and Technical Education, at cgoguen@precast.org.

Claude Goguen, P.E., LEED AP, is NPCA's director of Sustainability and Technical Education.

ONE SOURCE FOR Sustainability



The Euclid Chemical Company continues to acknowledge that sustainability is a critical driver for both company success along with employee satisfaction. We are pleased to be recognized by the NPCA for our sustainability efforts. For more than a hundred years, The Euclid Chemical Company has served as a leading supplier to the concrete and masonry industry offering a full line of engineered concrete admixtures and construction products.

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EUCLID CHEMICAL

Meet the **NEW** *Precast Inc.* Editor: **Sara Geer**



SARA GEER

Greetings!

As the new editor of *Precast Inc.*, I feel a little like the captain of a ship – sailing to discover new treasures

with a good idea of where we are and a vision of where we can go.

I joined NPCA in May as a journalism and communication professional with a multimedia background and plan to bring those skills to this publication and all member communications. *Precast Inc.* has highlighted and discussed the latest and most important topics within the precast concrete industry for many years. It's my mission to maintain that critical content while helping *Precast Inc.* grow by providing additional:

- **ADVICE** from leading voices in the precast concrete industry.
- **ENHANCEMENTS** that will more deeply integrate the magazine and our website, precast.org, with added videos, blogs and interactive resources for NPCA members.
- **EXCLUSIVE** information and material you can't get anywhere else.

However, I cannot sail alone! I need your regular feedback, article ideas and suggestions so we can make the magazine even better together. Please do not hesitate to contact me with your thoughts or even to say hello! I can be reached at sgeer@precast.org or (800) 366-7731.

Founder Remembered

Former Chairman, Yoakum Awardee Douglas G. Hoskin, 89, Passes

NPCA is saddened to learn that Douglas G. Hoskin, one of the founding members of the association, passed away on Thursday, June 5, at Parkwood Hospital in London, Ontario. A professional engineer, Hoskin was president of a concrete step manufacturer in Ontario, Unit Step Woodstock, when he was among a group of visionary producers and suppliers who helped establish the National Precast Concrete Association in 1965. Hoskin served in a variety of capacities with the fledgling association and then served as NPCA chairman of the Board in 1973.

Hoskin is one of two NPCA founders who have been honored by NPCA with annual awards in their name. The Douglas G. Hoskin Award is presented during the Chairman's Banquet at the Annual Convention to the member who has sponsored the most new members in the previous year. NPCA presented Hoskin with the other founder's award, the Robert E. Yoakum Award, in 1967. He was the first recipient of the Yoakum Award.



DOUGLAS G. HOSKIN

Ron Hyink retires after 13 years

After 13 years as the managing editor of *Precast Inc.* and *Precast Solutions* magazines, Ron Hyink retired on May 31. Ron came to NPCA after a career in the U.S. Air Force, and the military's loss was the precast industry's gain. Ron provided an expert editing eye for all NPCA publications during his tenure, and he is now settling into his new life of leisure as NPCA's first retired employee. Congratulations Ron!



RON HYINK

Looking for Precast Plants to Test New Sustainability Program

The Sustainability Committee is looking for 10 precast plants across North America to volunteer to test a new Microsoft Excel-based program. This program can calculate three environmental impact factors: global warming potential, primary energy consumption and water use. The software enables plants to benchmark themselves and measure progress.

This pilot project requires no financial commitment. Users will be trained via webinar and provided with continual support during the 12-month test period. Entering data should be simple and the results could be very helpful to any plant operator who wants to increase efficiency, lower operating costs and decrease the plant's impact on the environment. Plant data will be kept completely confidential.

Interested? Contact Claude Goguen, director of Sustainability and Technical Education at (317) 582-2328 or at cgoguen@precast.org for more information.

NPCA welcomes new staff member Catherine Lewis

Catherine Lewis started at NPCA earlier this year to aid member services. She will now use her communication and organizational skills to manage the membership database, new member processing and all member/non-member inquiries.

Lewis earned her journalism degree from University of Southern Indiana in Evansville, Ind. Before coming to NPCA, she worked for a brokerage firm as a transportation sales representative. She's excited to be in her new role.

In her spare time, Lewis enjoys spending time with her husband and reading.


She can be reached at clewis@precast.org or (800) 366-7731.



CATHERINE LEWIS

UPCOMING 2014 NPCA WEBINARS

NPCA provides webinars on an ongoing basis to provide producers with vital education for all facets of running a precast concrete plant. Below are the webinars scheduled for the remainder of 2014. All webinars start at noon Eastern time.

 For course descriptions and registration for any of the webinars, please visit precast.org/2014webinars

2014 NPCA WEBINAR SCHEDULE

DATE	TOPIC	INSTRUCTOR	PRICE
July 23, 2014	<i>Cracks Are Whack! A Guide to Proper Precast Concrete Crack Repair</i>	Claude Goguen	\$79 Per Location
Aug. 20, 2014	<i>Building a Lean Culture</i>	Paul Akers	\$79 Per Location
Sept. 3, 10, 17, 24*	<i>PQS II Technical**</i>	Claude Goguen	\$495 Per Person
Oct. 7, 8, 9*	<i>PQS II QA/QC</i>	Claude Goguen	\$495 Per Person
Nov. 5, 2014	<i>Healthcare Reform: How Will Your Business Be Affected in 2014 and Beyond?</i>	Jamie Hasty	\$79 Per Location
Nov. 19, 2014	<i>Cold Temperature Concreting</i>	Claude Goguen	\$79 Per Location
Dec. 3, 2014	<i>PQS II Safety (Precast Specific Module)</i>	Gus Gonzalez	\$150 Per Person

* Attendance at all sessions is required for PQS II webinars. ** Due to the advanced math concepts covered in PQS II Technical, students are required to take and pass NPCA's PQS II Technical Math Prep course as a prerequisite for this course. The math prep course will be offered as a free three-day webinar on Wednesday, Aug. 27, 2014, from 1 p.m. to 4 p.m. Eastern time. If you would like to try to test out of the math prep course, please contact Kathy Ritsmon at kritsmon@precast.org.

Challenge Question and Answer from the May/June issue:

Question: A structure in your yard is scheduled to ship within the next month. You find a crack on the structure. After having determined the extent of the repair, what major factor would influence your choice of repair material?

Answer: Below are a few factors that should weigh in your answer.

1. Is the crack dormant or active? Will the sealant need to be flexible or rigid? Using a rigid epoxy to fix a crack can sometimes cause a crack to form adjacent to the repair. If stresses in the structure exist that exceed the concrete capacity, it will form its own expansion joint by cracking.
2. Where is the crack located? Is it on a vertical or horizontal surface? Is it near an edge?
3. What does the project specify in terms of repair material? Many projects contain directions on repair materials. If none is available, consult with the owner for an approved product list. Your plant should also have approved methods and materials in the event the owner defers to you for a decision.
4. What exposure will the repair material be subject to? Foot traffic, vehicular traffic, deicing chemicals, and/or cold or wet conditions?
5. And finally, aesthetics play a role. Is this an exposed architectural piece that requires a color match? Or, will the structure be buried underground?

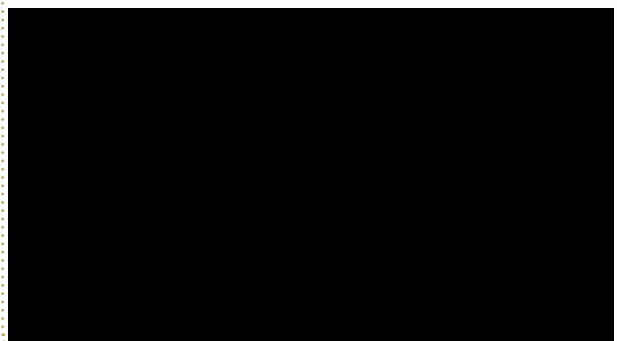
Products on the market for crack repair are manufactured to address these factors and are sold in different colors and textures.

THIS IS THE KIND OF STUFF STUDENTS LEARN ABOUT ON NPCA EDUCATION WEBINARS!

THINK YOU KNOW YOUR STUFF?

Take the challenge and answer the following question. Send your response to cgoguen@precast.org and if yours is the correct answer chosen, you will get one free admission to one of our 60 minute webinars being presented in 2014. We will accept one answer per person. **Good luck!**

CHALLENGE QUESTION: Calculate the location of the center of gravity of the following structure:



CONGRATULATIONS TO JOE ZACHARA FROM CONCRETE IMPRESSIONS OF FLORIDA!

Joe wins a complimentary webinar registration for any of the remaining five – 60 minute webinars scheduled for 2014.

The Sweet Smell of Success: Irene Kurtz

Our sense of smell is a powerful tool. Discover just how far it has taken one NPCAF scholarship recipient.

BY MASON NICHOLS

Imagine entering a busy bakery in New York City on Christmas Eve. The shop is lively with customers clamoring for last-minute holiday cookies, cakes and pastries. Despite all of the shouting and commotion, your mind is targeted on only one thing: the wonderful assortment of smells.

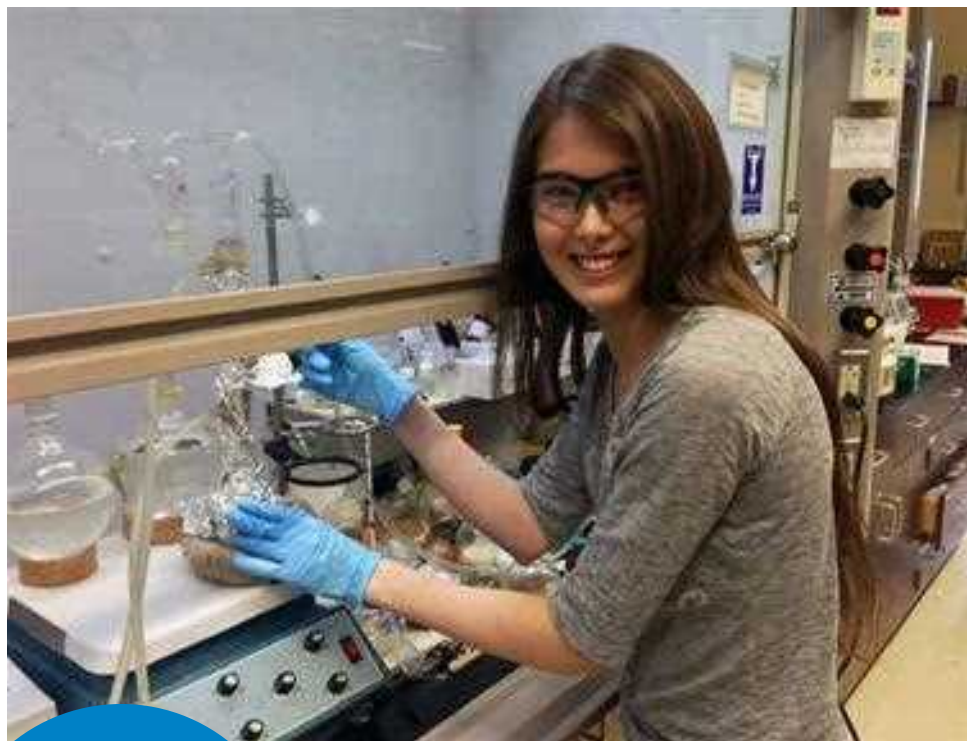
The human sense of smell is amazing. In fact, people can recall scents with 65% accuracy even after a year.¹ It's no wonder, then, that many of us associate smells with important events or emotions from our past. For Irene Kurtz, an NPCA Foundation (NPCAF) scholarship recipient currently attending the University of Notre Dame, one particular smell stands out from the rest.

"It's a strange thing, but I love the smell of concrete," Kurtz said.

Kurtz's appreciation for concrete and its scent originated with her father, a professor of structural engineering at Lafayette College. As a child, Kurtz recalls spending plenty of time with her dad, zipping and darting through the engineering labs at various state universities. These opportunities allowed Kurtz to quickly develop both her love of the smell of concrete and a tremendous appreciation for the engineering field.

"I grew up at college," Kurtz said. "I've seen the research side and the hands-on side, which is why I'm so interested in engineering and structural engineering."

Prior to entering college, Bernard Soluta, a project manager at Bethlehem Precast and friend of the Kurtz family, spoke with



IRENE KURTZ

"It's a strange thing, but I love the smell of concrete."

– Irene Kurtz

Kurtz about the opportunities available in the engineering field. During their discussions, Soluta suggested applying for the NPCAF scholarship, something for which Kurtz said she is forever thankful. "I'm so glad Mr. Soluta reached out to me and suggested I apply," Kurtz said. "It's been such a huge help and it has been so great. Whenever I receive the scholarship in the mail, I always email him saying 'thank you' because I am so grateful."

Though Kurtz began her academic career at Lafayette College, she recently decided to seek new opportunities by transferring to Notre Dame. This transition was accompanied by a switch in majors, with Kurtz shifting from civil to chemical engineering. Kurtz stressed that the decision was made possible thanks to the support of the scholarship. "Switching majors – even as only a sophomore – is a huge leap," she said.



“One of the reasons I was so interested in initially applying for the scholarship is because of how green precast concrete is. A lot of people don’t think that concrete and engineering are sustainable, but they really are.” – Irene Kurtz

“It has helped so much with books, and now I’m staying at Notre Dame over the summer for research. That’s only possible because of the funding from the scholarship.”

Kurtz’s research allows her to focus on her interest in green energy. Over the summer, she will continue her work on making industrial practices more sustainable through reducing the amount of heat required for chemical reactions to take place.

Ultimately, Kurtz explained that her goal is to help the environment and the world’s population by adhering to green engineering processes, something which can be accomplished through the use of precast concrete. “One of the reasons I was so interested in initially applying for the scholarship is because of how green precast concrete is,” Kurtz said. “A lot of people don’t think that concrete and engineering are sustainable, but they really are.”

With a strong work ethic and the support of the NPCAF, Kurtz continues to strive toward establishing a more sustainable world. With any luck, that world will be powered by the durability, strength – and, of course, smell – of concrete. ■

Mason Nichols is NPCA’s external communication and marketing manager

Reference:

¹ <http://www.mirror.co.uk/lifestyle/health/20-fascinating-facts-sense-smell-1977351>

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Oldcastle Manufactures Record-Length Precast Concrete Girders


Oldcastle Precast-Perris, California, has manufactured the largest and heaviest precast/prestressed concrete super girders the California Department of Transportation (CALTRANS) has ever set and placed for a bridge undercrossing.

General Contractor Security Paving, located in Sylmar, California, contracted Oldcastle to produce 20, 158-ft-long super girders for the Norwalk-San Antonio Bridge undercrossing section of the \$1.6 billion Santa Ana Freeway South Corridor Improvement Project.



Photo courtesy of CALTRANS

The super girders contain a wide flange beam design and are 8,500 psi in compressive strength. The bridge is being constructed in three stages and is comprised of prestressed girders supported by cast-in-place abutments. The beams have facilitated decreased construction time, improved structural performance and cost saving advantages.

The entire project extends nearly seven miles from the Los Angeles County/Orange County line to I-605 to widen the freeway, bridges and overcrossings adding one High Occupancy Vehicle (HOV) lane and one general purpose lane. Project completion is scheduled for late 2015. 

CALTRANS CONSTRUCTION CREWS WORKED AT NIGHT TO PLACE 20 PRECAST/PRESTRESSED CONCRETE SUPER GIRDERS FOR THE NORWALK-SAN ANTONIO BRIDGE UNDERCROSS.

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CASE STUDY

ARCHED SOFFIT FOR CURVED BRIDGE BEAM

"The curved beams for this project were critical. Hamilton Form delivered a soffit for the beams that made the casting simple – we supplied the drawings, they did the rest. I'd count on them for any project when the dimensional accuracy and quality of the product are essential."

*Dennis Fink, General Manager, Plant Operations
Northeast Prestressed Products, LLC*



The Project:

The original Frederick Avenue Bridge in Baltimore was a two-span concrete arch design built in 1930. In keeping with the historical character of the area, the replacement bridge is a two-span prestressed concrete structure designed to imitate the original bridge.

The Challenge:

Northeast Prestressed Products, LLC in Cressona Pennsylvania is supplying the precast elements for the project, including 12 arched sections assembled to create 2 arches on each side of bridge replicating the look of the original double arches.

The Solution:

To cast the beams, Hamilton Form fabricated a soffit that is 44' long and curves to a 52'6" radius. To form the radius, the understructure material was cut with a high-definition plasma cutter to hold tight dimensional tolerances.

The Results:

Just like the quality of the precast product is dependent on the form it's cast in, the quality of a curved soffit depends on the understructure. The accuracy of the understructure allowed the skin to be easily welded in place. The resulting product is stunning.



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BASF introduces new packaging for MasterFiber MAC Matrix product

BASF's Construction Chemicals division based out of Cleveland, Ohio, released in May new packaging for its Master Builders Solutions brand MasterFiber MAC Matrix macrosynthetic fiber.

The packaging condenses the fibers in an aligned format, improving their dispersion in the concrete mixture. The enhanced dispersion reduces balling, impacting placement, screeding and finishing operations during concrete production and placement. In addition, the aligned fibers prevent individual fibers from curling or tangling prior to use.

Another benefit of the new packaging size includes the ability to add unopened bags directly into the concrete mixture. The condensed size provides freight and distribution efficiencies and reduces storage requirements for concrete producers.

MasterFiber MAC Matrix is primarily used as a secondary reinforcement in slab-on-ground applications, precast elements and composite metal decks. For more information, visit master-builders-solutions.basf.us.

McNamee rejoins Besser Company sales team

Terry McNamee has rejoined the Besser Co. sales team as a regional sales manager in May.

McNamee brings more than 30 years of sales experience having started his career working with architectural products in 1982. His passion for supporting customers and in-depth knowledge of the concrete products industry is what initially led him to join the Besser sales team in 2006.

He returns to cover the northeast region of the U.S. alongside current employee Randy VanSickle to allow more time to effectively support the company's existing customers.

McNamee can be reached at (215) 205-5600 or via email at tmcnamee@besser.com.

Besser Company reveals new logo, website



Besser Company has unveiled a new logo and website to recognize several milestones celebrated in 2014,

including 110 years of business in the concrete products industry and 60 years of industry education.

The logo incorporates the original 1960s globe design to represent the company's global presence. The tagline "trusted since 1904" was also added to acknowledge Besser's longevity in the industry as a leader for quality concrete products, equipment and parts for masonry, hardscape, pipe and precast.

In addition, the website is designed specifically with customers in mind. The site is compatible with all browsers, tablets and mobile devices making content easier to navigate and share. The site features concrete products, equipment, technical support materials and educational opportunities.

For more information, visit www.besser.com.

Cresset develops water-based release agent

Cresset Chemical Co., a manufacturer of release agents based in Weston, Ohio, has advanced its original Crete-Lease 20-VOC-Xtra Release Agent for use on high-profile architectural and decorative concrete applications.

The non-toxic, non-flammable product is water-based and meets EPA's allowable VOC (volatile organic compounds) amount. The proprietary blend is comprised of a blend of vegetable and mineral oils in water that contains no waxes, silicones or carcinogens.

Crete-Lease 20-VOC-Xtra permits easy, stain-free removal of forms and formliners from hardened concrete while reducing bug holes on the concrete surface.

The product has been used on high-profile projects such as the lion relief at the MGM Grand Hotel in Las Vegas and the decorative floodwalls recently constructed in New Orleans.

For more information, visit cresset.com.



LION RELIEF, MGM GRAND HOTEL IN LAS VEGAS

Lafarge North America sponsors National Building Museum exhibition

Lafarge North America announced it is the lead sponsor for Designing for Disaster, a new year-long exhibition held at the National Building Museum in Washington D.C.

The exhibition, open to public viewing now through Aug. 2, 2015, will discuss disaster mitigation and highlight tools and strategies for building safer, stronger and more resilient communities that are both functional and beautiful.

Through the use of graphics, multimedia and video testimonials, the exhibition will explore new solutions for a range of natural hazards including earthquakes, tornados, hurricanes, storm surges, flooding, sea level rises, tsunamis and wildfires.

To compliment the exhibition, the National Building Museum and its partners have planned a full slate of public programming. Topics include the effects of hurricanes in urban areas,

the Rebuild by Design project that hopes to revitalize the region affected by Hurricane Sandy, the rising waters of the Chesapeake Bay and the importance of resilient landscapes.

For more information about the public programming and exhibition, visit www.nbm.org.

Anchor announces three recent promotions

John Tait, general manager for the Kingston, Ontario, Anchor Concrete Products Limited and Anchor Rebar Supply Inc., has



LEFT TO RIGHT: ROY BARON, JOHN TAIT, JUDE TREMBLEY

been named president of both operations, Jeff Bradfield, chief executive officer, announced.

Tait has been with the company since 2002, starting as a controller. His promotion is part of a growth plan that ensures the

companies maintain the needs of Anchor's customer base and varied product lines.

In addition, Roy Baron, who has been controller, was promoted to vice president of finance. And Jude Trembley, who has been sales and marketing manager, was promoted to vice president of customer service.

Trembley will oversee customer service in the engineering and shipping and sales departments.

Visit anchorproducts.com for more information.

Spillman Company expands magnet product line

Spillman Company has introduced two new Button Magnet Adapters to be used with the 1 and 2 1/2 ton EZY-STRYP button magnets. The adapters are designed to provide a wide range of magnet applications for when precasters use a variety of forming materials on steel casting tables.

Spillman offers a complete line of EZY-STRYP magnets and magnet products designed specifically for the precast concrete industry.

Spillman, located in Columbus, Ohio, manufactures custom steel forms for the precast concrete industry. In addition, Spillman also sells a wide range of plastic rebar accessories and protective devices, air and electric internal and external vibrators, EZY-STRYP® magnetic clamping devices, and production hardware and accessories.

For more information, contact (614) 444-2184 or visit www.spillmanforms.com.



SPILLMAN'S EZY-STRYP BUTTON MAGNETS

Molenaar introduces European product to North America

Molenaar North America, an American subsidiary of Molenaar Betonindustrie located in the Netherlands, has released a new product to the North American market.

The company's concrete spacers are made of high performance concrete to maintain the material integrity of the concrete cover. Because they are made out of concrete, the spacers bond with the surrounding concrete and also have the same thermal expansion and do not leave gaps which leads to enhanced durability of the final product.

Molenaar's concrete spacers are available in various mix designs and in colored concrete. The concrete spacers are engineered to be nearly invisible to fit all types of precast products. The concrete spacers can be fixed to the rebar in various ways including the MoClip, MoStek or steel wire.

For more information, please contact info@molenaar-americas.com or visit www.molenaar-americas.com.



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Meeting	Location	Date
NPCA 49th Annual Convention	Le Centre Sheraton Montreal – <i>Montreal, Quebec</i>	Oct. 22-25, 2014
The Precast Show 2015	Orange County Convention Center – <i>Orlando, Florida</i>	March 5-7, 2015
The Precast Show 2016	Gaylord Opryland Hotel – <i>Nashville, Tennessee</i>	March 3-5, 2016
The Precast Show 2018	Hyatt Regency Denver – <i>Denver, Colorado</i>	Feb. 22-24, 2018

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

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