

CONCRETE FLOOR EPOXY

# Buzzer-Beater: Crew Assists on Hoops Arena Revamp

BY BEN DUBOSE  
PHOTOS COURTESY HARDIG INDUSTRIAL SERVICES

**F**ifth Third Arena has been a staple of the University of Cincinnati (UC) campus since 1989. The Ohio arena is home to UC's men's and women's basketball teams along with women's volleyball, and it can also host entertainment events.

With more than 20 conference titles won by UC men's hoops in that span, the ~12,000-seat arena has seen significant traffic from devoted fans. Thus, in late 2015, UC approved an \$87 million modernization. One aspect was to upgrade the concrete flooring, including multiple concourse levels, locker rooms, restrooms, and even underneath the wood basketball floor.

For Kevin Kipp, estimator and senior project manager at nearby Hardig Industrial Services and a men's basketball season-ticket holder, the project's large scope and its location served as both a challenge and a fun opportunity.

"In November 2016, we got invited to bid," Kipp recalled. "We were kind of wavering. We weren't sure if we actually wanted to pursue a project of this size. But we went out and walked the space, and me having gone to school there and loving UC sports, that pushed us harder to get after it."

A joint venture of Skanska and locally based Megen Construction Co. served as the general contractor, and a prior relationship proved critical.

"We had done a lot of work for Megen in the past," Kipp said. "It was a manager who wasn't on this specific project who went to bat for us and said, 'If you want to talk to someone about the resinous flooring, you need to reach out to these guys at Hardig Industrial.'"

## Game Plan

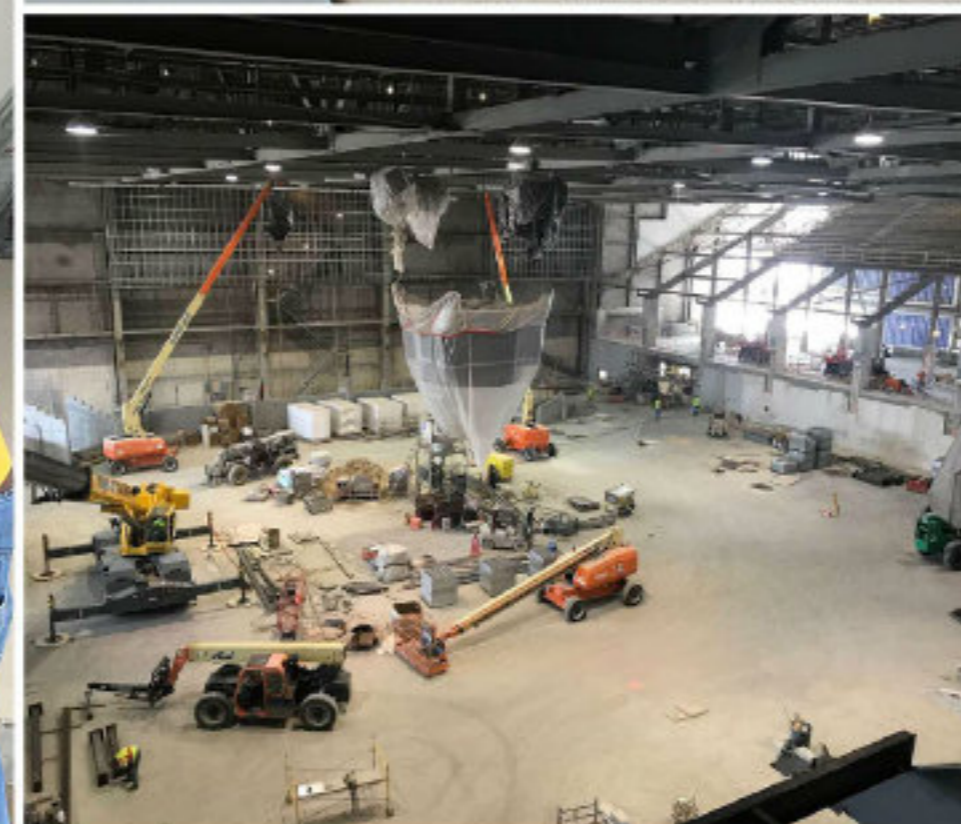
In all, there were 190 tradespeople on the massive Fifth Third Arena project, which meant some of them — including the



The University of Cincinnati arena was undergoing an \$87 million renovation, including an epoxy system. An 8- to 10-person crew from Hardig Industrial Services took 7 months to complete it.



Not only did the crew have to move 200+ skids of materials and equipment in and out during school hours, but they also had to work with the active urban campus.



## Hoops Arena Revamp

coatings crew — had to wait to be subbed in.

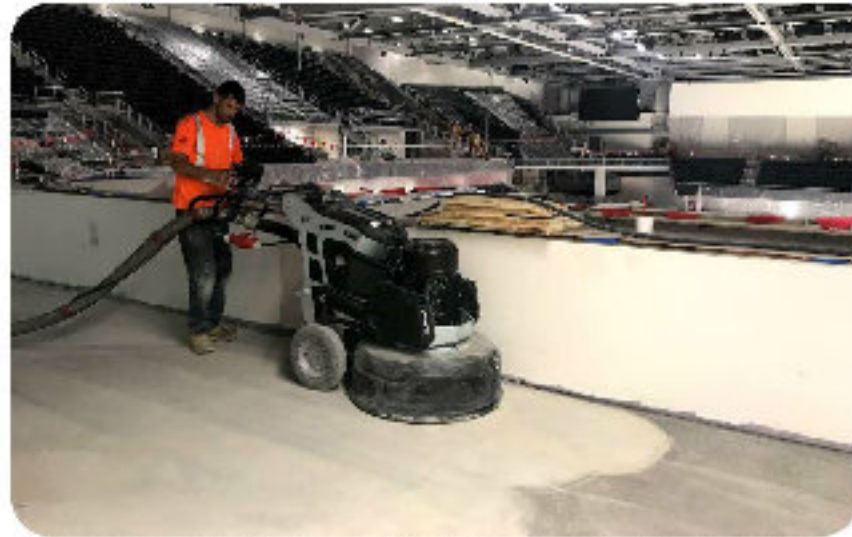
"The scope was basically an entire demolition of the interior," Kipp said. "They kept the four outside walls but took out everything inside. It was basically a shell of a building. They removed the existing structures to create wraparound concourses and 360-degree seating. The first year was basically a lot of demolition and installing new concourses and stands. It was a total mechanical upgrade."

While that was going on, Hardig worked with both UC and the general contractors to make sure its plan was a winner.

"Pretty much all of 2017, we spent doing mockups and submittals of product," Kipp said. "We didn't do any work other than design and look at the demo."

During the early design phase, the owner's architect had asked for a stained logo for the main concourse entry; Kipp called for a tactical adjustment.

"I voiced my concerns for the longevity of the stained option with the expected traffic," Kipp explained. "These were the original 30-year-old slabs, and they were spalled and destroyed. There was no way we could've polished what they had. We then partnered with CTS Cement to discuss pouring an integrally colored logo, despite never having done something of this magnitude. Hours and hours were spent developing a plan

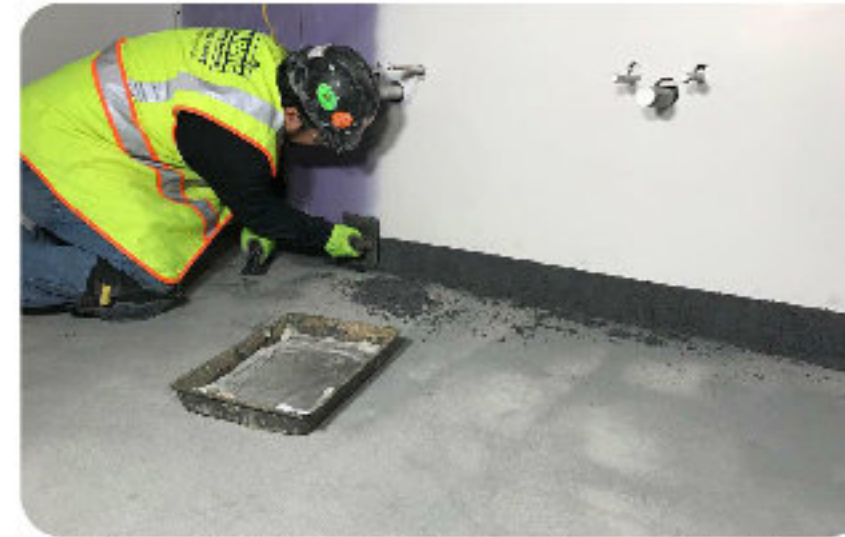


In the concourses, the crew polished the concrete with remove-controlled and hand-held grinders. They filled the joints with polyurea and then finished the concrete with a densifier and protective sealer, both by Prosoco.

and working with specialty pigment manufacturers to match Pantone colors in concrete, working with drafters to develop forms on a waterjet, and working up a few mockups."

### Four-Point Play

Four-part jobs are as rare for most contractors as four-point



The resinous flooring system by Sika covered concessions, storage areas, locker rooms, and restrooms. After shot blasting the concrete, the crew installed a 4-inch (10.2 cm) integral cove base.

plays are in basketball. But with the revised plan for the 35-foot by 25-foot (10.7 m by 7.6 m) polished logo at 0.5-inch (1.3 cm) thickness, that's what the UC job had become when coatings work began in April 2018.

"The original scope was not the largest we had ever done," Kipp said. "But once we got involved, we started obtaining more work, and they gave us more opportunities. We built relationships, and they trusted us. By the time the project was completed, it was absolutely the largest project Hardig Industrial has done to date."

The original job scope for the crew, which averaged 8 to 10 daily workers, included resinous flooring work in concessions, storage areas, locker rooms, and restrooms, along with polishing new and existing concrete in concourses. But the logo overlay increased the complexity, as did another late addition.

"The self-leveling underlayment was not in the original scope," Kipp said. "In the lower bowl, under the permanent

The basecoat was applied with a rake, and aggregate was broadcast to excess. That layer was followed by a clear grout coat and a final topcoat with aggregate for non-slip qualities.



## JOB AT A GLANCE

### PROJECT:

Apply several flooring systems as part of a revamp to Fifth Third Arena

### COATINGS CONTRACTOR:

Hardig Industrial Services  
6750 Kepler Rd.  
Cleveland, OH 45002  
(513) 873-3448  
www.hardigindustrial.com

### SIZE OF CONTRACTOR:

~25 employees

### SIZE OF CREW:

8-10 crew members

### PRIME CLIENT:

University of Cincinnati  
2600 Clifton Ave.  
Cincinnati, OH 45220  
(513) 556-6000  
www.uc.edu

### SUBSTRATE:

Concrete

### CONDITION OF SUBSTRATE:

Varied, existing and new

### SIZE OF JOB:

150,000 sq. ft. (13,935.5 m<sup>2</sup>)

### DURATION:

1.5 years total; 7 months to apply the systems

### UNUSUAL FACTORS/CHALLENGES:

- » The crew had to move equipment and 200+ skids of material in and out during school hours at the active urban campus.
- » The crew worked with drafters to create a poured and polished logo.

### MATERIALS/PROCESSES:

- » To resinous flooring:
  - Shotblasted to achieve a Concrete Surface Profile (CSP) 4-6
  - Installed Sika Decoflake UEF system with 4-inch (10.2 cm) integral cove
  - Installed Sikafloor-22 NA PurCem urethane cement at ~0.25 inch (0.64 cm) using a CAM gage rake; broadcast Sikadur-509 to excess
  - Squeegeed Sikafloor 264 at ~12 mils (304.8 microns)
  - Squeegeed Sikafloor 217 as grout coat at ~16 mils (406.4 microns)
  - Applied Sikafloor 510 LPL polyaspartic topcoat at ~5 mils (127 microns) and added Sika's Barefoot 20 aggregate for non-slip qualities
- » Applied self-leveling underlayment under the wood basketball court; polished and sealed new and existing concrete in concourses; and polished overlay and logo in main entry areas

### SAFETY CONSIDERATIONS:

- » Completed stretch/flex exercises, hazard analysis, and toolbox talks
- » Wore hard hats, safety glasses, high-visibility vests or shirts, steel-toed boots, and cut-resistant gloves at all times
- » Wore 3M's disposable N95 particulate respirators with dust masks, used of dustless shrouds and vacuums, and wore face shields when grinding or chipping

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## Hoops Arena Revamp



The crew covered various aspects of safety, including stretch and flex exercise, toolbox talks, and personal protective equipment (PPE). Because of new silica standards, the crew prepped with dustless shrouds and vacuums.

wood basketball court, we completely leveled that floor to get the flatness and level where it needed to be before putting the hardwood floor back on top of it."

In all, the resinous flooring, polished concrete, overlay, and self-leveling underlayment added up to a total footage of ~150,000 square feet (13,935.5 m<sup>2</sup>). Initial specifications called for the coatings crew to begin working in January, but delays elsewhere pushed it to April.

Nonetheless, the job still had to be finalized by late October since tickets were already sold for the 2018-19 season! The Bearcats had been kicked out of their home to nearby arenas for the prior year, and teams were eager to move back in. Thus, the crew was aggressive in formulating its game plan.

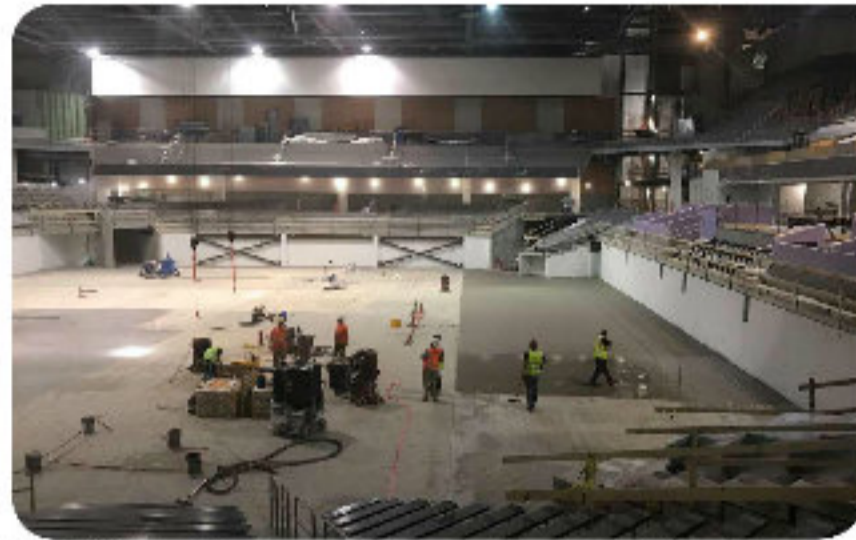
### Beating the Buzzer

For a job this large, planning was essential. Fifth Third Arena sits in the center of an active, urban campus, so moving equipment and 200+ skids of material in and out during school hours was a challenge. Thus, Kipp and other Hardig officials were diligent in establishing protocols and precise timetables with UC.

"There had to be a ton of logistics because we were in so many places around the arena," Kipp explained. "Our entire existence in the arena had to be mobile, so we had to be able to move our equipment." When transit was required, a custom-printed FloorShell from Triamco with Hardig's logo was used to cover and protect the inside floor.

Another priority was safety, since the high-profile project began after the implementation of enhanced silica standards from the U.S. Occupational Safety and Health Administration (OSHA). "This created a sensitive environment for dust control and environmental and safety concerns," Kipp said. "Our OSHA silica plan was a major part of our preparation."

Hard hats, safety glasses, high-visibility vests or shirts, steel-toed boots, and cut-resistant gloves were worn at all times as personal protective equipment (PPE). For silica compliance, extra PPE included wearing 3M's disposable N95 particulate respirators with dust masks; using dustless shrouds and



Under the basketball court, the crew used a thermal laser to map and achieve proper flatness. Then, they used scarifiers, scalers, and brush hammers before applying the self-leveling underlayment with gage rakes.

vacuums; and wearing face shields when grinding or chipping. Each morning, crew members went through stretch and flex exercises and toolbox talks to analyze potential hazards.

"Good communication was key because everyone knew their roles," Kipp said. "They didn't need to be babysat throughout the project."

While substrates were both existing and new concrete, each presented unique challenges. "All the existing concrete was extremely rough from the demolition of existing floor treatments," Kipp said. "And the new pour concrete was extremely challenging to polish, due to it being a lightweight mix on a metal deck."

Phase one involved applying 30,000 square feet (2,787.1 m<sup>2</sup>) of resinous flooring. For this, crew members shot blasted existing and new concrete using a Blastrac 1-10D to achieve a Concrete Surface Profile (CSP) 4-6, required to install the Sika Decoflake UEP system with 4 inches (10.2 cm) of integral cove base.

"We had to get those floors done first so the mechanical contractors, kitchen equipment personnel, plumbers, and others could come in behind us," Kipp explained. "Everything had the integral [cove] base, and everything had to be completely seamless."

For that system, the initial layer was the Sikafloor-22 NA PurCem urethane cement basecoat — applied at approximately 0.25 inch (0.64 cm) using a CAM gage rake from Seymour Midwest — with Sikadur-509 aggregate broadcast to excess. Then, the Sikafloor 264 100-percent solids epoxy primer was applied in black at an average of 12 mils (304.8 microns) using an 18-inch (45.7 cm) Midwest Rake squeegee from Seymour Midwest, with a 0.25-inch (0.64 cm) custom flake broadcast to excess. Next, the clear Sikafloor 217 was squeegeed as the grout coat at an average of 16 mils (406.4 microns), while the Sikafloor 510 LPL polyaspartic served as the topcoat at an average of 5 mils (127 microns), with Sika's Barefoot 20 aggregate added for non-skid qualities.

Meanwhile, phase two encompassed the application of 35,000 square feet (3,251.6 m<sup>2</sup>) of self-leveling underlayment



To apply the logo, which had to be developed on a waterjet, the crew shotblasted the concrete before applying a system by CTS Cement and densifier from Prosoco. It was sealed, too.

beneath the wood court. The crew first used a thermal laser to create a heat map of the floor's topography. Specifications called for a P<sub>1</sub> 50 level of floor flatness as defined by the ASTM E1155 standard, and to get there, the crew needed to know specifics on the degree of preparation required for each area of the floor. After prepping the surface, crew members then applied the Sika Level-125 topping using the CAM gage rake.

"It was thermal heat scanned so that we could understand the peaks and valleys of the floor," Kipp said. "We then did a lot of scarifying, scaling, and bush hammering to take the high spots down, then we put our topping in. Anywhere from an eighth of an inch [3.2 mm] up to one and a quarter inch [31.8 mm] is the range that it took to make that floor flat."

The third and last phase involved polishing ~60,000 square feet (5,574.2 m<sup>2</sup>) of concrete in the concourses and applying the ~25,000 square feet (2,322.6 m<sup>2</sup>) polished overlay and logo in the main entry areas. Polishing was done to a medium finish utilizing HTC DURATIQ T8/RT8 remote-controlled grinders and 5- and 7-inch (12.7 cm and 17.8 cm) Metabo hand grinders. Joints were filled with Metzger McGuire's Spal-Pro RS 88 polyurea via a U.S. Saws joint pump before crew members used a pump sprayer to apply Prosoco's Consolidack LS/CS densifier, capped by Prosoco's PolishGuard as a penetrating protective sealer.

"We selected the PolishGuard after doing ketchup and mustard stain testing," Kipp said. "We tested four or five options, and that one performed the best."

For the overlay and logo, all areas were prepped to a CSP 6 profile by shotblasting with the Blastrac 1-10D and running HTC Ravager series bush hammers with a DURATIQ RT 8 grinder. All areas were squeegeed with a CTS Rapid Set TXP epoxy primer at an average of 12 mils (304.8 microns) and broadcast to excess with 20/40 mesh sand.

Next, the CTS Rapid Set TRU PC high-flow topping was applied at 0.5 inch (1.3 cm) using the CAM gage rake. All TRU PC was mixed in CS Unitec's HIPPO Mixers and transported in CS Unitec's Pelican Carts before polishing via diamond tooling

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In total, the new and existing concrete covered 150,000 square feet (13,935.5 m<sup>2</sup>). "It's something we can see and be proud of," said Kevin Kipp, estimator and senior project manager at Hardig.

of juggling."

"The last month was probably the most difficult, because we were tying up loose ends," Kipp added. "We were finishing resinous flooring we couldn't get to, and doing small projects on all scopes of work. I had guys working almost 18 hours a day. I think we worked 17 Saturdays. It was a lot of overtime and a lot of two-shift work, because there was no moving the deadline."

Literally one day before the exhibition opener for the Cincinnati men's team, Kipp and his crew were still at work! "I was in there the day before the exhibition game, re-patching things that were damaged during the move-in," he said. "It was something that came down to the wire, that's for sure."

## Final Score

With the project finished just in time for the season, Kipp celebrated the job's completion by doing what he always does: Cheering on UC basketball at Fifth Third Arena.

"It was a project that I think everybody in our company can be proud to be a part of," Kipp said. "A lot of the work we do is in a food processing plant, or a pharmaceutical plant, or an automotive facility that we can't really showcase. We can't take our friends and family and show them with pride the amount of work that we do. In this case, we can take them to a game and say, 'We did this! We can show them for the next 50 years.'"

Based on the Hardig crew's success and positive feedback from the client and general contractors, Kipp already has his eye on future large-scale stadium projects, such as one for the nearby FC Cincinnati soccer franchise, which is slated to open a new stadium by 2021. "This job can be a résumé builder for something like that," he said.

Regardless of what the future holds, though, Kipp and his crew are happy to live in the present by supporting their team and simultaneously reflecting on a job well done. "That's the grand aspect of a job like this: It's something we can see and be proud of," Kipp said.

It took until the buzzer, but this Cincinnati crew converted its four-point play and took home a win! **CP**

from HTC and Runyon Surface Prep. The area was densified with Prosoco LS/CS and sealed with PolishGuard.

Because of the delayed start, the timetable went down to the wire. "Crunch time was absolutely maddening," Kipp said. "Not only were we trying to finish and get out, but all the other contractors were trying to do that, too. There was a lot

## Cement Technology Powers Logo

By Matt Sambol, Manager of Flooring and Polymer Systems at CTS Cement Manufacturing Corporation

The University of Cincinnati logo proved to be a challenge for Hardig Industrial, but they found the winning formula. The crew was tasked with finding an overlay material to make a 30-year-old slab look new. In addition to that, it needed to be integrally colored and polished to a high shine to bring the University of Cincinnati logo to life. It would also be expected to remain durable in a high traffic environment for years to come.

Hardig Industrial chose CTS Cement Manufacturing Corporation's Rapid Set TRU PC, a hydraulic cement-based self-leveling topping that could be placed at ½-inch (1.3 cm) thick and ground and polished to simulate the appearance of polished concrete.

The backbone of Rapid Set TRU PC is Rapid Set calcium sulfoaluminate (CSA) cement: a high-performance, hydraulic cement that provides structural strength in one hour with reduced shrinkage, low permeability, and superior resistance to sulfate attack. How does it work?

### Hydration and Crystallization

In Rapid Set CSA cement, the CSA hydrates quickly by chemically reacting with calcium sulfate and water to form ettringite. Ettringite is a strong, needle-like crystal that gives Rapid Set products high-early strength properties and allows TRU PC to exceed 5,000 psi (34.5 MPa) in 24 hours without additional chemical accelerators. The high early strength and surface hardness supplied by ettringite are critical when polishing to a high gloss the following day after placement.

In addition to the high-early strength, Hardig Industrial needed to ensure the floor product would maintain this high strength in the long term. Rapid Set CSA cement also contains dicalcium silicate (Ca<sub>2</sub>S), which reacts to form calcium silicate hydrate (C-S-H). This compound, also found in portland cement, reacts more slowly than the CSA and continues to react for a longer period, which helps provide the matrix with



long-term strength and durability. Those characteristics were ideal for the University of Cincinnati arena floor.

### Water Woes

Water is essential to hydrate cement, but too much water can traditionally create challenges as well. In traditional cement systems, the water required to get the necessary flow or workability during installation is more than what is necessary to hydrate the cement. The excess water is called water of convenience. But what happens to that excess water?

As the material sits in place, the heavier particles settle and displace the mix water. The water then forms capillaries as it rises to the surface. When the water reaches the surface, it is called bleed water. The bleed water eventually evaporates and the capillaries in the hardened material become microscopic voids that decrease the density and strength of the floor. Any water of convenience that is still trapped after the material has hardened will slowly evaporate over time, leading to drying shrinkage cracks.

With Rapid Set CSA cement, the ettringite forms quickly, preventing the settling, and it consumes more water in the hydration process, which eliminates bleed water and greatly reduces long-term drying shrinkage. Instead, TRU PC forms a dense, strong matrix that allowed Hardig Industrial to grind and polish within 24 hours.

### Winning Formula

For the University of Cincinnati arena floor, Hardig Industrial was able to deliver a durable floor that could be integrally colored and polished to make the university logo shine. Rapid Set CSA cement's chemistry provided the backbone that allowed them to polish the following day after placement. It provided a dense matrix to allow a high gloss on the finished floor, and it will remain durable in the high traffic environment for years to come. **CP**