WRITTEN BY **CHRIS KING**

Protecting Home Court

Roof Restoration Project Brings Back Luster to Quicken Loans Arena

Re-roofing sports and entertainment venues presents its own set of challenges. Sports arenas usually host concerts and other events, so scheduling and logistics can be difficult. Quicken Loans Arena in Cleveland – also known as "The Q" – is home to the Cleveland Cavaliers of the NBA, and it hosts some 200 other diverse events every year, including concerts and conventions. In 2015, realizing the roof was reaching the end of its useful life, the owners looked for advice on their next move. A team of roofing professionals recommended a roof restoration system that would provide the protection and recreate the aesthetics of the original roof – and keep disruption to the facility at a minimum.

Ohio companies stepping up to help the home team included architect Osborn Engineering, headquartered in Cleveland; roof consultant Adam Bradley Enterprises of Chagrin Falls; roofing manufacturer Tremco Roofing and Building Maintenance, headquartered in Beachwood; and roofing contractor Warren Roofing & Insulating Co., located in Walton Hills. After comprehensive testing revealed that more than 90 percent of the roof could be restored, they developed a plan to clean, repair and completely restore the 170,000-square-foot main roof of Quicken Loans Arena using a liquid-applied system from Tremco Roofing.

John Vetrovsky of Warren Roofing and Joe Slattery of Tremco Roofing shared their insights on the project with *Roofing* magazine. Both men were brought in during the planning stages of the project and saw it through to completion. "We were helping to budget the project with Adam Bradley and Osborn Engineering," notes Vetrovsky. "They were asking about a few different systems, and the Tremco system was the best fit for the project."

Warren Roofing has served the greater Cleveland and Akron area since 1922, and Tremco's roots in northeast Ohio go back to 1928. Warren Roofing served as

PHOTOS: TREMCO ROOFING AND BUILDING MAINTENANCE

The 170,000-square-foot roof of Quicken Loans Arena was completely restored using a liquid-applied system from Tremco Roofing.

the general contractor and roofing contractor on the project. The scope of work included updates to the lightning protection system, the safety cable system, and the heat trace system used to melt snow in the gutters.

REPAIRING THE EXISTING ROOF

The existing system was the structure's original roof. It was 24 years old, and consisted of a mechanically attached hypalon membrane over two layers of polyisocyanurate insulation totaling 3 inches. The roof membrane was showing some wear, and sections had sustained damage from an interesting source: fireworks from nearby Progressive Field, home of the Cleveland Indians, launched after the Indians hit home runs. After the damage was detected, the team changed the direction the fireworks were launched, and the problem ended.

Despite the damage, visual analysis and a nuclear roof moisture test using a Troxler meter confirmed the roof was an excellent candidate for restoration. "There was some wet insulation and warped insulation, and we marked off those areas that had to be replaced," notes Slattery. "It was a small fraction of the total job."

Crews from Warren Roofing removed and replaced the damaged insulation, cutting through the membrane all the way down to the existing 6-mil vapor barrier on the deck. "All of that insulation had to be stair-stepped back so we could properly lap in the new material," Vetrovsky says. "We got rid of all of the damaged insulation, and we repaired the vapor barrier. Then we staggered the two new layers of insulation, matching the existing thickness."

Where possible, the existing membrane was pulled back and glued into place. In sections where new membrane was needed, crews adhered pieces of EPDM.

The plan specified adding the fasteners in the existing roof and any repaired sections before the coating system was applied. Tremco Roofing conducted uplift testing through Trinity ERD to ensure the results met or exceeded the specified design. "There was a significant upgrade to the fastening," Vetrovsky says. "Because of the shape of the building, the perimeter enhancement was probably the greatest I've ever seen."

Screws and 3-inch plates were used. In the field, the minimum was 4 feet on center, 12 inches apart. In the perimeter, fasteners were installed 2 feet on center, 8 inches apart. "It worked out nicely because the fastening ended up in the middle of the sheet, and now the sheet has fasteners that are original at the seam, and a foot or two over, there is a row of new fasteners," notes Vetrovsky.

CLEANING UP

Prior to the fasteners being installed, the membrane was cleaned by crews from Tremco Roofing using the company's RoofTec system. "We cleaned the membrane no more than 30 days ahead of what Warren Roofing was doing," notes Slattery. "We had to mobilize at least three times to clean the roof so the time elapsed would never be more than 30 days."

The cleaning solution is applied using a custom-designed tool that looks like a floor polisher. It has a 2-foot diameter head that spins to clean the surface and a vacuum that recaptures the water, which is returned via hoses to a truck so contaminated waste water, environmental pollutants and high-pH cleaning solvents can be filtered out. "All of that water goes back into the sanitary system after it's filtered," Slattery explains. "It does not go into the sewer system."

"It's very fast, it's very effective, and it's very efficient because you can easily see the areas that have been cleaned," notes Vetrovsky. "With power washing, you don't have any way to filter the water."

The biggest challenge on the cleaning portion of the project was the arena's sheer size. Approximately 500 feet of hoses were needed to supply water and return it to the truck for filtering.

Cleaning of the substrate is a crucial step, according to Vetrovsky. "The system really does a nice job cleaning the membrane, and that is the key to any restoration project," he says. "You're only as good as the surface you're applying it to."

APPLYING THE NEW ROOF SYSTEM

After the sections were cleaned, crews installed the liquid-applied AlphaGuard MT system. The three-step process consists of a primer, a base coat with a fiberglass mat embedded in it, and a topcoat. In this case, the primer was applied with rollers. "The area that we primed each morning was the section we would apply the first coat of AlphaGuard MT with the fiberglass mat that afternoon," Vetrovsky says. "We did not prime ahead. We didn't want to take the chance of dust adhering to the primer."

After the roof surface was cleaned, the restoration system was applied. The three-step process consists of a primer, a base coat with a fiberglass mat embedded in it, and a topcoat.

Care had to be taken with the schedule to complete the work efficiently. "Once the base coat is on, you have 72 hours to apply the top coat," Vetrovsky explains. "We would install the base coat and the fiberglass mat for two to three days to get a big enough area. The topcoat would go on faster because you're not embedding any mesh into it. You really had to always keep an eye on the future weather to make sure you could get the topcoat on within the 72 hours."

The topcoat was applied with both rollers and spray equipment. After the topcoat was applied, crews installed a second coat with sand embedded in it as a wear surface. Because of the roof's curved surface, walk pads were not feasible, so the sand was used to provide additional traction for any workers conducting ongoing maintenance.

The sand was broadcast by hand and back-rolled into the coating to maintain a uniform appearance. "Part of this project was to make sure the sand looks uniform when it is visible from a blimp overhead," notes Vetrovsky. "That was a difficult task, but the guys did a great job."

The roof features three different finish colors, which were custom designed to match the roof's original color scheme. The main roof is light gray, with black under the large LED sign. The sections over the wings are white, as are the 2-foot-wide stripes.

"They wanted black under the new LED sign so it would really show the letters nice and clear, even during the day," says Vetrovsky. "We also put the white stripes back to match the roof's original appearance.

That was a challenge, to keep everything straight. It's hard to chalk lines on a curve, but it came out nice. Everything matches what the original roof looks like."

Penetrations for the sign included round posts that held the rails about 2-1/2 feet above the roof level. The liquid-applied membrane made coping with details easy, according to Vetrovsky. "The liquid membrane makes the flashing details all one piece with the roof system," he says. "We removed the existing boot flashings so that we could seal directly to the conduit or steel posts."

GUTTERS, LIGHTNING PROTECTION AND SAFETY SYSTEMS

The large commercial gutters also needed to be refurbished. The gutters were 4 feet deep and 4 feet wide, and were outfitted with a cable snowmelt system, which had to be removed. "The gutters had a lot of damaged insulation, so material in the gutter sections was 100 percent torn off," notes Vetrovsky.

In the gutters, tapered insulation was installed, and a cover board — DensDeck from Georgia-Pacific — was added for increased durability. New EPDM membrane was installed and cleaned prior to the three-step coating application. New heat trace cable was also installed.

The lightning protection system also required repair, and close coordination with the subcontractors was critical. "The existing lightning protection had to be removed to apply the new roof system, but we couldn't remove it 100 percent, because we still had to have an active lightning protection system for the building," says Vetrovsky. "We rearranged the lightning system and

installed new stanchions to try to eliminate as many horizontal lines as we could."

During construction, key to the safety plan was a perimeter barrier system, which was installed by workers who were 100 percent tied off. After the system was in place, workers inside the barricades did not need to wear personal fall arrest systems. "The entire perimeter had a barricade system put on before any material was even loaded," Vetrovsky says. The company makes its own barricade sections, which are anchored to the parapet walls and gravel stop edges and feature a downward leg for added support.

As part of the project, crews also installed permanent safety equipment. "There was an existing tie-off system out there, but it was not a certified system and we couldn't use it," Vetrovsky says. "We brought that to the owner's attention and replaced it with a new certified tie-off system manufactured by Guardian Safety."

CHALLENGING SCHEDULE

Progressive Field and the Quicken Loans Arena are right next to each other, and logistics and scheduling around the stadiums was difficult. Work began in 2016 and finished in 2017, and the demanding schedule was made even more difficult when both the Indians and the Cavaliers made deep runs into the playoffs. In 2016, the Cavs became NBA Champions. But it was the Indians making it to the 2016 World Series that posed bigger logistical problems for the re-roofing project.

"The first part of the schedule was the most difficult, as we had the get the black coating on the roof under the sign prior to the playoffs," Vetrovsky says. The sign covered approximately 30,000 square feet of roof area, and it was difficult to access the roof surface beneath it. "Crews had to work on their hands and knees to apply the coating beneath the steel framing. That was towards the fall, when the weather started changing, and one of the biggest hurdles was just getting the roof dry in the morning. It got colder and colder as we got down to the wire, but we made our deadline for the work under the sign."

The staging area was also limited, and the crane could only lift material to one section of the roof. Some material had to be moved by hand some 2,000 feet. "It was an awfully long walk from one end of that roof to the other," Vetrovsky recalls.

Concerts and other events held during the construction cycle made the schedule even more challenging. "The most notable event was probably the Republican National Convention, which totally shut the site down for more than a week because of security," notes Slattery.

Concerts usually necessitated loading in the early morning and clearing the staging area by 8 a.m., but usually work could continue during the day. "We had to do a lot of coordination to make sure we had what we needed to work the entire day and also not go against our commitment to the owner that we would not work past certain hours," Vetrovsky says. "Many of the special events started after 7 p.m., so we would be long gone by then."

CHAMPIONSHIP CALIBER

The project was wrapped up earlier this year. Vetrovsky and Slattery agree that the system chosen was a great fit for this project for several reasons. With restoration, there is less noise, less disruption, and less equipment than with a re-roofing project, and the roof has a warranty for the next 20 years. The process also limits negative impact on the environment by preventing removal and disposal of the old roof system.

"The weight was also a factor," notes Vetrovsky. "With the existing structure, there wasn't a lot of room for a different type of roof system with heavy cover boards. This roof system was perfect because it doesn't add a lot of weight."

The coating also minimized installation time, notes Slattery. "The disruption of a roof replacement in a hospitality setting like that, where they need 250 days of revenue stream, restoration becomes a real attractive option," he says. "I can't think of one day where we really disrupted anything."

Vetrovsky points to his talented crews as the key to meeting tough schedules with top-quality production "What we can offer is skilled labor," he says. "We're a union contractor and our guys are well trained. The harder, the better for us. We can handle projects that most other contractors won't even put a number to — this project being one of those."

He credits Adam Livingston, a third-generation foreman for Warren Roofing, for his work on the project. "With his experience and attention to detail, we were able to complete this project on time, meet the expectations of the client and Tremco, and match the unique aesthetic requirements of the roof," says Vetrovsky. "We have a lot of great employees who take pride in their work. Take all of that together, that's why we can be successful on projects like the Quicken Loans Arena."

The Cavaliers taking the NBA Championship during the project only added to the excitement. "It's a great feather in our cap," notes Slattery. "Restoration is a growing segment of the market. Instead of letting the clock run out on these roofs, if you catch them at the right time, it can be a phenomenal way to keep costs down and it's good for the environment because it's not adding waste to landfills."

QUICKEN LOANS AREA CLEVELAND, OHIO

TEAM

ARCHITECT: Osborn Engineering, Cleveland, Ohio
www.osborn-eng.com

ROOF CONSULTANT: Adam Bradley Enterprises, Chagrin Falls, Ohio
www.adambradleyinc.com

GENERAL CONTRACTOR: Warren Roofing & Insulating Co., Walton Hills, Ohio
www.warrenroofing.com

MATERIALS

ROOF CLEANING SYSTEM: RoofTec, Tremco Roofing
www.tremcoroofing.com

ROOF RESTORATION SYSTEM: AlphaGuard MT, Tremco Roofing