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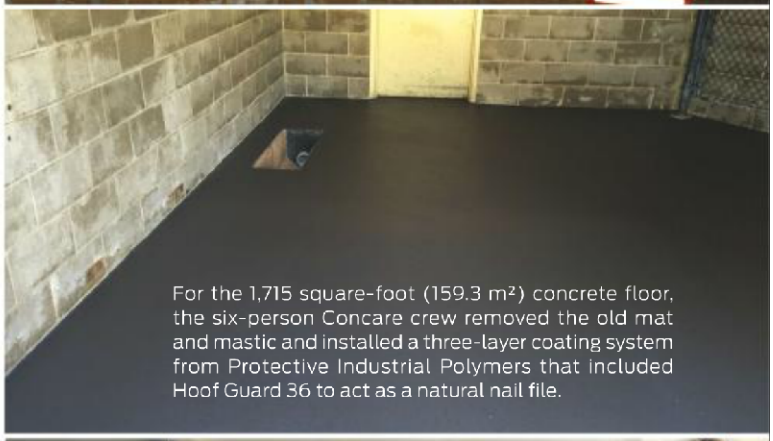
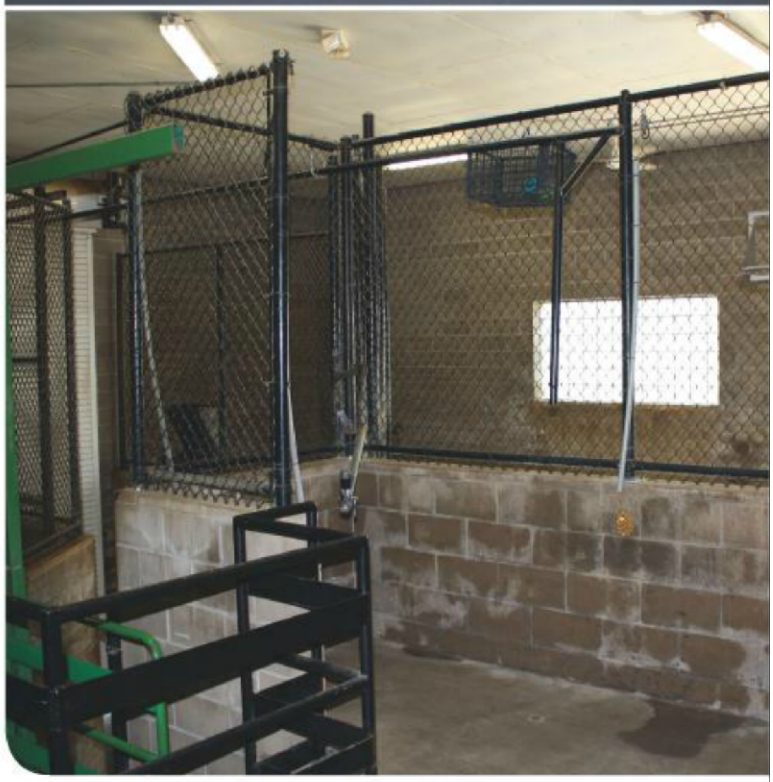
A Tall Order: Giraffe Enclosure Overhaul

BY **JENNIFER FRAKES**
PHOTOS COURTESY **PROTECTIVE INDUSTRIAL POLYMERS**

The giraffe enclosure at the Niabi Zoo in Illinois needed some TLC. The old system wasn't keeping up with the giraffe-ians, and they needed walls and floors that were antimicrobial and seamless.



For the 1,715 square-foot (159.3 m²) concrete floor, the six-person Concare crew removed the old mat and mastic and installed a three-layer coating system from Protective Industrial Polymers that included Hoof Guard 36 to act as a natural nail file.



The Niabi Zoo, located in Coal Valley, Illinois, is home to more than 140 species of animals. The zoo prides itself on being a leader in conservation and education, and it is committed to maintaining the health and safety of its animal residents at all times. So when they determined that the floor and walls of the indoor portion of the giraffe exhibit could become a safety hazard for these majestic animals, the Niabi Zoo knew it was time to call in the coating experts at Concare Inc. and Protective Industrial Polymers (PIP).

"Along with our manufacturing partner, Protective Industrial Polymers, we were invited to evaluate the interior of the giraffe enclosure. We were tasked with recommending a removal and replacement solution for the failing wall and floor covering that would keep the giraffes safe, be easy to clean, and reduce the risk of bacterial and fungal growth," said Ron Puszynski, president of Concare Inc. Concare and PIP worked together to find the right solution for some of the zoo's most popular — not to mention tallest — animals.

Clean Room

Indoor enclosures are vital to the safety and well-being of the animals at the zoo. These areas are where the animals retire for the night and are protected from inclement weather, and where zookeepers and veterinarians are able to monitor the animals' health and perform any necessary medical procedures. Keeping these indoor areas clean and sanitary is imperative.

Upon arriving at the giraffe exhibit, Puszynski and the team discovered that FRP, or fiberglass panels, were installed on the walls to keep the area clean and sanitized. As part of the care for the animals, the zoo has a strict regimen for cleaning and sanitizing all exhibit and enclosure areas. The zoo is committed to keeping the enclosures free from microorganisms that might harm the animals, and the fiberglass sheets were glued to the walls to create a smooth surface that was easily

The walls' fiberglass panels (FRP) were deteriorating and needed to be redone. The plan was to use a four-stage coating system, which included a more viscous material than on the floors. But first: prep!

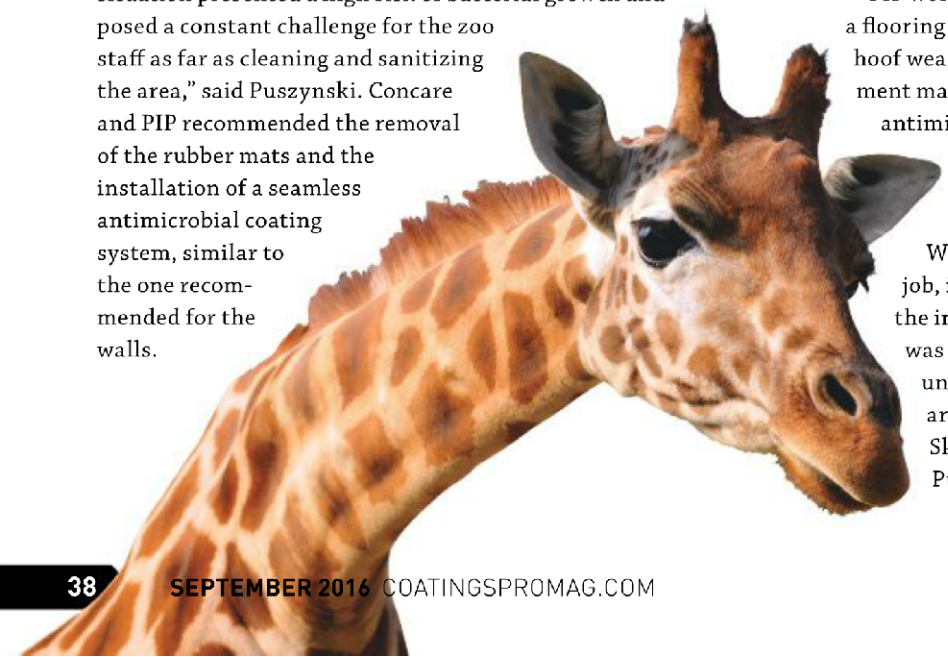
Because of the heights of the enclosures, the crew needed to use scissor lifts at times. They also wore dust masks, safety shoes, safety glasses, and Tyvek protective suits, when necessary.

cleaned and did not encourage the growth of bacteria. However, there was one major problem: The giraffes were able to break the FRP. That meant that it was beginning to chip off.

"The FRP served its purpose until the panels began to deteriorate. Like most animals, giraffes are naturally curious, and over time, they figured out that they could gnaw at the wall covering. This created not only a situation where the walls were no longer sanitary, but it also meant that the giraffes could ingest the chips of FRP," explained Puszynski.

Concare and PIP knew that the panels must be removed and replaced with a system that did not pose the same health hazard to the animals. "We proposed that all panels and the glue underneath be removed so that the concrete block wall was exposed. Once the exposed concrete was clean, we proposed the application of PIP's seamless, antimicrobial coating system," stated Puszynski.

The crew also found that the floors were in need of a new solution. Rubber mats had been glued to the concrete substrate for slip resistance. However, these mats were not providing the antimicrobial solution that the zoo required. "The mats came in sections, and water had seeped in between the pieces. This situation presented a high risk of bacterial growth and posed a constant challenge for the zoo staff as far as cleaning and sanitizing the area," said Puszynski. Concare and PIP recommended the removal of the rubber mats and the installation of a seamless antimicrobial coating system, similar to the one recommended for the walls.



Hoof Maintenance

While the Niabi Zoo was happy with the antimicrobial solution that was proposed, they were looking for a coating system that could also solve another issue: hoof maintenance. Hoof maintenance is a critical aspect of caring for giraffes and other hoofed animals, as their "nails" need to be trimmed for safety and health reasons. A textured floor can act as a natural nail file, which in turn, is not only a benefit to the animals but also aids the large animal veterinarians. "With the right type of textured floor, hoof maintenance by a veterinarian becomes less frequent. This is great for the safety and well-being of the animals, as it reduces frequency of sedation," explained Puszynski.

Previously, the zoo had not found the right technology that was antimicrobial, safe for the animals, and provided hoof maintenance. According to Puszynski, discussions began with animal experts from Niabi Zoo as well as other zoos to discuss the proper texture for the giraffe enclosure. "Simultaneously, Concare worked with PIP to explore textures that would solve both the safety and hoof care challenges. In presenting an array of texture solutions, one was chosen that fit the requirements of zoo experts," stated Puszynski.

"PIP worked closely with zoo personnel to come up with a flooring solution that helps promote consistent, even hoof wear," said Arlie Newberg, PIP's business development manager. This solution consisted of a comprehensive antimicrobial floor and wall system with a custom-designed textured topcoat.

Going Vertical

With the PIP antimicrobial coatings chosen for the job, it was time for the Concare team to get to work on the indoor enclosure space. The first order of business was to remove the FRP wall covering and the mastic underneath. "Obviously, the walls of the exhibit are very tall to accommodate the giraffes. We used Skyjack scissor lifts to access the highest areas," said Puszynski. These lifts have barricades on all sides,

so fall protection was not necessary while crew members were on the lifts; however, extreme caution was exercised at all times.

The six-man crew used Metabo 7-inch (17.8 cm), handheld diamond grinders to prepare the surface and remove all mastic and adhesive on the 5,620 square feet (522.1 m^2) of wall area. The surface preparation was very labor intensive, as the crew was holding the 15- to 17-pound (6.8–7.7 kg) grinders against a vertical surface. "The surface prep took a significant amount of time. We needed to make sure to remove all remnants of the adhesive and create a uniform surface for the application of the pretreatment material," stated Puszynski.

The pretreatment material used was PIP's Protect AM-PT-BW, a single-component antimicrobial penetrant that is designed to create a moisture barrier. The material forms a colloidal gel that is antifungal and antimicrobial and penetrates 2 to 4 inches (5.1–10.2 cm) into the substrate. According to the PIP technical data sheet, Protect AM-PT-BW penetrates the concrete substrate and reacts with free alkali and/or alkaline hydrates, internally producing an extremely dense silica hydro-gel with antimicrobial and antifungal properties that fill the micro spaces and voids around aggregate or in block. This hydro-gel permanently seals the matrix blocking water, vapor, or contaminant movement at 50–100 square-foot per gallon (1.2–2.5 m^2 per liter).

"We spray applied the Protect AM-PT-BW using a high-volume, low-pressure sprayer. This layer is extremely important because if there should ever be a breach of the coating system, the wall surface will still have antimicrobial properties," explained Puszynski. The Protect AM-PT-BW is specially formulated for walls, as it is more viscous than its floor counterpart.

After waiting 24 hours and allowing the material to fully penetrate into the concrete walls, the crew was ready to apply the Protect 1200 AM-WR primer. This antimicrobial two-component, water-reducible epoxy primer was applied with rollers at a thickness of 5–6 mils (127.0–152.4 microns). "After the primer had cured — about two hours — it was time for the application of Protect 1000 AM, an epoxy resin filler. This material was flat troweled on in two coats. It is used like spackle to fill irregularities and level out the substrate," said Puszynski, who added that, although the thickness will vary, it averaged 30 mils (762.0 microns) per layer. This epoxy resin was applied over the course of two days, and according to Puszynski, the goal was to create walls that were like a sheet of glass: easy to clean and sanitize and free from imperfections that can catch dirt or other contaminants.

At this point, the crew stopped work on the walls and moved to the 1,715-square-foot (159.3 m^2) floor area of the giraffe exhibit. A rounded cove base was created along the bottom of the wall, eliminating any angles or transition areas where dirt or other materials could be captured. "We wanted to complete the floors before the final wall coating was applied so that the entire enclosure was seamless. We covered the floors once the finish coat had cured, and we went back to roller apply the finish coat — Protect 2000 AM — at a thickness of 4–5 mils [101.6–127.0 microns] to the walls," stated Puszynski.

JOB AT **A GLANCE**

PROJECT:

Apply an antimicrobial coating system to the floor and walls of the indoor area of the giraffe exhibit at the Niabi Zoo

COATINGS CONTRACTOR:

Concare Inc.
2081 N 15th Ave.
Melrose Park, IL 60160
(708) 681-8800
www.concare.com

SIZE OF CONTRACTOR:

~43 employees

SIZE OF CREW:

6 crew members

PRIME CLIENT:

Niabi Zoo
13010 Niabi Zoo Rd.
Coal Valley, IL 61240
(309) 799-5107
www.niabizoo.com

SUBSTRATE:

Concrete and concrete block

CONDITION OF SUBSTRATE:

Good

SIZE OF JOB:

1,715 sq. ft. (159.3 m^2) on the floor, 5,620 sq. ft. (522.1 m^2) on the walls

DURATION:

8 days

UNUSUAL FACTORS/CHALLENGES:

- The enclosure needed to have an antimicrobial and seamless system.
- Hoof Guard 36 was broadcast into one of the coating layers to act as a natural nail file for the hooves of the giraffes.

MATERIALS/PROCESSES:

To the walls:

- Removed the existing fiberglass panels (FRP) with Metabo grinders
- Spray applied Protect AM-PT-BW, an antimicrobial penetrant, at 50–100 sq. ft. per gallon (1.2–2.5 m^2/L)
- Roller applied Protect 1200 AM-WR primer at 5–6 mils (127.0–152.4 microns)
- Trowel applied Protect 1000 AM in two coats at an average thickness of 30 mils (762.0 microns)
- Roller applied Protect 2000 AM at 4–5 mils (101.6–127.0 microns)

To the floors:

- Removed the existing rubber mats and mastic with Airtec scarifiers
- Spray applied Protect AM-PT per specs at 150–200 sq. ft. per gallon (3.7–4.9 m^2/L)
- Trowel applied Protect AM-UC-RP and broadcast Hoof Guard 36 to rejection at approximately $^5/_{16}$ inch (7.9 mm)
- Roller applied Protect 2000 AM-UR at 15–16 mils (381.0–406.4 microns)

SAFETY CONSIDERATIONS:

- Wore dust masks, safety shoes, safety glasses, and Tyvek protective suits, when necessary

To the walls' 5,620 square feet (522.1 m²), the crew removed the old system using grinders. In total, the crew completed the repair and coating of walls and floors over the course of eight days.

According to Ron Puszynski, president of Concare Inc., "The giraffes can no longer break apart the wall and floor covering, which is a wonderful development for their overall safety."

Floor and Hoof Solution

Surface preparation was vital not only on the walls but also on the floor. The Concare team removed the rubber mats and all remaining adhesive using Airtec scarifiers. Once the floors were properly prepared, the crew spray applied the pretreatment material to the concrete floor per specs at 150–200 square feet per gallon (3.7–4.9 m² per liter). "The Protect AM-PT has all of the same antimicrobial and penetrative properties as the material used on the walls, but it is slightly less viscous since it is applied on horizontal versus vertical surfaces," said Puszynski.

VENDOR TEAM

Airtec
Equipment manufacturer
Industriestrasse 40
CH-4455 Zunzgen/BL
Switzerland
41 (0)61-976-9525
www.airtecusa.com

Metabo
Equipment manufacturer
1231 Wilson Dr.
West Chester, PA 19380
(800) 638-2264
www.metabo.us

Protective Industrial Polymers
Coatings Manufacturer
7875 Bliss Pkwy.
North Ridgeville, OH 44039
(440) 327-0015
www.protectpoly.com

Skyjack Inc.
Equipment manufacturer
55 Campbell Rd.
Guelph, ON, Canada N1H1B9
(877) 755-4387
www.skyjack.com

Tyvek by DuPont
Safety equipment manufacturer
1007 Market St.
Wilmington, DE 19898
(302) 774-1000
www.tyvek.com

After 24-hours, the crew used trowels to apply applied Protect AM-UC-RP, a rapid curing cementitious urethane coating. The specially designed Hoof Guard 36 was then broadcast to rejection into the cementitious coating. "The Hoof Guard 36 broadcast layer is what will keep the giraffe's hooves filed and healthy," stated Puszynski. This layer of the coating system has a finished thickness of approximately 5/16-inch (7.9 mm).

It was then time for the crew to apply the finish coat to the floors. PIP's Protect 2000 AM-UR is a high-solids, high-gloss, two-part, aliphatic polyurethane coating. According to Puszynski, this coating is antimicrobial, ultraviolet (UV) stable, and offers excellent chemical resistance, making it a perfect choice for the final layer of PIP's coating system for the giraffe exhibit. The finish coat was roller applied at a thickness of 15–16 mils (381.0–406.4 microns).

Throughout the eight days of the project, the Concare crew paid close attention to all matters of safety, wearing dust masks, safety glasses, safety shoes, and Tyvek protective suits when necessary.

The Height of Success

According to Puszynski, the Niabi Zoo and its tallest residents are thrilled with the new walls and floor of their indoor enclosure. "The giraffes can no longer break apart the wall and floor covering, which is a wonderful development for their overall safety. The seamless and antimicrobial PIP coating system is also keeping them safe from harmful microorganisms. Together with Protective Industrial Polymers, we were able to offer solutions that went above and beyond what the animal experts at zoo thought were possible. That's a great feeling," said Puszynski.

Also, with each step, the giraffes at the Niabi Zoo are receiving the best hoof care around. "Niabi Zoo had used our floor products in the past and noticed a dramatic decrease in hoof maintenance costs due to our high-wearing, yet easily cleanable topcoat texture," Newberg said. "For this project, we further tailored the system to be completely antimicrobial for both the floor and walls." That's a tall order fulfilled! **CP**

Creating a Comprehensive Antimicrobial Concrete Coating System

*By **Sean M. Walsh, Marketing and Product Development Manager for Protective Industrial Polymers***

Antimicrobial polymer concrete floor and wall coatings have been around for some years now. Most coating manufacturers offer some type of "antimicrobial" coating. In most cases, this coating is "field manufactured," meaning there's a type of antimicrobial additive in the resin base, which is activated with a curing compound and applied directly to the substrate.

At the Niabi Zoo project, the crew from Concare used Protective Industrial Polymers' Protect AM-PT-BW to the walls and Protect AM-PT to the floors for antimicrobial protection.

Debunking the Myth

Although coatings can contain an additive with antimicrobial properties, this does not mean that the coating itself will be resistant to dangerous microbes, including bacteria, molds, mildew, fungus, and spores. A coating can be categorized as an antimicrobial coating by the mere fact that it contains a known antimicrobial agent. The reality and not well known fact is that this alone does not mean the final coating is antimicrobial. Therefore, step one in creating a comprehensive antimicrobial system is to fix what's been inherently broken all along.

Different antimicrobial additives, at differing concentrations, react differently in various types of polymer technologies. While one antimicrobial additive might work in an epoxy coating, that additive may not react the same way in a polyurethane coating, for example.

To ensure that the proper qualities can be offered to clients such as the Niabi Zoo, it is important that proper bench testing be done when formulating coatings that are intended to inhibit the growth of dangerous microbes, such as per the American Association of Textile Chemists and Colorists (AATCC) and International Organization for Standardization (ISO) testing standards. These tests involve closely monitoring antimicrobial additive percentages within the chosen polymer matrix and creating cured specimens. These coating specimens must then be independently tested to ensure the cured coating does not support the growth of the specific microbe(s) of concern.

What Lies Beneath

Why is this necessary? Concrete, by its very nature, is a porous material that retains and transmits moisture. Concrete substrates are full of dark, damp crevices and capillaries that make them ideal breeding grounds for a number of microbes, including bacteria and fungi.

Even with the best coating technologies, installed with the most professional methods, coating wear and joint failure can occur. Additionally, normal or aggressive wear from foot and equipment traffic, abrasion loads, hot water wash downs, and abrasive chemical cleaning can cause floor or wall surface damage. Wear, chips, spalls, and cracks in floors and walls are a perfect breeding ground for dangerous microbes. And because common cleaning/wash down techniques cannot penetrate deep into these areas, bacteria can live for extended periods in the concrete and pose potential health threats.

This is certainly a concern in areas subject to thermal-shock or cycling generated from hot and cold temperatures and wash downs, such animal care and wash areas. Therefore, it is important to protect the most sensitive part of the floor or wall system, which is the substrate itself, and also to fill all control and expansion joints with an antimicrobial flexible sealant in addition to the coating.

Most concrete densification products are designed to react at the substrate surface level. This aids in producing a harder, easier to polish concrete substrate. Protective Industrial Polymers' Protect AM-PT products don't react as quickly and, therefore, are able to penetrate further down into the concrete substrate, hydrostatically sealing the concrete substrate from within. This means that Protect AM-PT fills the voids and capillaries up to 6 inches (15.2 cm) within the concrete with an aqueous gel, which contains antimicrobial properties, sealing the matrix of the concrete and limiting its permeability, in effect making the concrete substrate and not just the surface "antimicrobial."

Putting It All Together

The key to achieving comprehensive antimicrobial protection is to prevent the growth of microorganisms throughout the client's floor or wall system and deep within the concrete substrate. The whole idea here is a redundant, layered means of antimicrobial protection. An antimicrobial substrate that is coated with an antimicrobial primer and subsequent antimicrobial build coats/mortars and topcoats provides the most comprehensive method for preventing microbe growth. As expected, proper maintenance, repair, cleaning, and resealing the topcoat are recommended, but Concare's ultimate goal was to create a surface that will not support the growth of dangerous microbes, even as the coating wears or cracks over time. *CP*