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PROOF!****NEW INTUMESCENT COATINGS**

- Old Roof Gets New Life With UV-Sensitive Coating
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# Good As New & Changes Hue!

## UV-Sensitive Coating System Gives New Life to an Old Roof

By Michele Ostrove

From a bird's eye view, the 10-acre roof of the Pier 1 Imports warehouse in Mansfield, Texas was a study in changing hues, turning from white to black to blue to all-white, within a matter of days.

And, as the roof's color changed, its temperature dropped more than 60 degrees, thanks to an innovative UV-sensitive coating that goes on blue and turns white in the sun.

When the 444,000-square-foot distribution center was built by the Fort Worth-headquartered home furnishings retail chain 16 years ago, it was covered with Firestone EPDM, a relatively inexpensive black roofing material that resembles inner-tube rubber. It was later painted white to reduce its temperature. By 2002, the EPDM and its topcoat of paint were in bad shape.

Originally covered with black EPDM and then painted white 16 years ago, the 10-acre roof of this Pier 1 Imports warehouse in Fort Worth, Texas is coated with the UV-sensitive Eraguard 1000, a low-VOC acrylic that goes on blue and turns white within a few hours of sun exposure. The new coating reduced the average temperature of the roof by 40 to 60 degrees.

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Crews spent an inordinate amount of time on surface prep of the warehouse roof. The first step was power washing (above), using a Rahsco standard power washer and 30-inch surface cleaner power washer, which operates like a push-type lawnmower, but gets the job done thoroughly.

(Facing page, clockwise from top left), the Eraguard 1000 coating was applied with airless spray equipment pumped by two hydraulic machines stationed on the ground. The old EPDM roof was adhered to rigid foam insulation that was mechanically attached to a 22-gauge-steel deck, adding to the difficulty of surface prep. Seen from above, the newly coated 10-acre warehouse roof will yield huge energy savings for Pier 1. An October 2003 temperature comparison between the old EPDM roof and newly coated roof showed a significant temperature decrease.

“EPDM seams and flashings typically lasts about 15 years,” explains Jim Leonard, president of ERSystems, a roof coatings manufacturer that specializes in cool-roof restoration systems. “Then, the adhesives break down, and the seams come apart.”

## Off With the Old?

Faced with the expensive — and environmentally unattractive — prospect of reroofing with new EPDM, Pier 1’s management hired Gary Hudspeth of LRW Consultants, Inc. of Dallas to look at other alternatives. The roofing consultant had worked with Pier 1 since 1996, writing specs for previous warehouse reroofing projects in Chicago and Savannah, Georgia. After contacting a few contractors and coming up with no ideas, Hudspeth found Boyd, Inc., a 30-year-old roofing company based in Mansfield, four miles from the distribution center. President Gary Boyd told Hudspeth about ERSystems’ roof restoration program, which uses two different acrylic coatings to reinforce the weaknesses inherent in the EPDM membrane, extending its life another 15 years. Hudspeth was excited.

“Why fill up a landfill if you don’t have to?” Boyd asks. “With this system, we can restore the roof by redoing all the

## JOB at a GLANCE

### PROJECT:

Save a 16-year-old EPDM roof and apply an Energy Star coating rather than completely replacing the entire roof system.

### COATINGS CONTRACTORS:

Boyd, Inc.  
601 South Sixth Ave.  
Mansfield, Texas 76063  
(817) 477-3436

### SIZE OF CONTRACTOR:

Average 20-25 full-time employees

### SIZE OF PROJECT TEAM:

8-man preparation and roof-repair team, 3-4 coating applicators

### PRIME CLIENT:

Pier 1 Imports (U.S.), Inc.  
301 Commerce Street, Suite 600  
Fort Worth, Texas 76102

### SUBSTRATE:

16-year-old Firestone EPDM roof fully adhered to rigid foam insulation and mechanically attached to a 22-gauge steel deck.

### SUBSTRATE CONDITION:

Ranged from good to very poor. Many old EPDM patches and seams had loosened. 10,000 square feet of damaged membrane had open seams, cuts throughout, and weeds and grass growing in the accumulated dirt.

### SIZE:

Approximately  
444,000 square feet

### DURATION:

Preparation crews spent 3 weeks replacing damaged EPDM, then power washing and cleaning the existing roof surface. An additional 2 weeks was required to prime and install more than 7 miles of butyl seam tape over the existing field seams. Coating crews began working as soon as the preparation crews were far enough ahead to phase the work properly. The two coats of urethane and acrylic coating were applied over 24 working days.

### UNUSUAL FACTORS:

Client’s schedule required fall work, with heavy condensation, cooler temperatures, and windy days. A photosynthesis agent was added to

the acrylic coating to allow it to cure more efficiently in the fall weather.

The condition of the seams required an EPDM primer and a fabric-backed butyl seam cover tape to ensure long-term water-tightness. Several areas of decking had been point-loaded when the original roof was installed. Approximately 50 of these deflected areas were cut open, the deck repaired and leveled, and the EPDM re-secured and stripped in properly.

### MATERIALS/PROCESS:

- Power wash entire roof with 4,000 psi scrubbers.
- Tear off and replace 10,000 sq/ft of damaged roofing membrane with DensDeck recovery board, and ERSystems’ EPDM roofing system.
- Scrape and peel off excessive pools of old coating.
- Repair over 200 old patches.
- Prime and strip in 7 miles of cut seams using ERSystems’ Primer One and fabric-backed butyl tape.
- Repair and reinforce through-wall scupper corners, skylight corners, and other curb areas of weakness.
- Apply 2.5 gal/per/sq of ERSystems’ Urethane Ultra coating to the lower trough areas on each side of the building in order to handle some light ponding of water.
- Apply approximately 2.5 gal/per/sq of ERSystems’ Eraguard 1000 using Hennes-Johnson hydraulic 45:1 pumps.

### SAFETY CONSIDERATIONS:

- Used in-house boom truck with hydraulic debris tray to move tear-off materials to prevent falling debris.
- Acrylics and Urethane Ultra were chosen for their highly favorable VOC ratings.
- A pre-construction meeting was held with contractor, consultant, owner, and material manufacturer. The entire process, including the order and timing of each step, was discussed and modified to meet with owners’ and contractors’ access and cleanliness issues.
- The building has 3-4 ft parapet walls on perimeter, so fall safety was not an issue.



seams, penetrations, and other areas that could have problems, and applying a coating that retards moisture. You end up with a sustainable roof that otherwise would be torn off and trashed.”

Hudspeth spec'd the bid for the innovative system and Boyd, who'd had plenty of experience working with ERSystems, came in low bidder. With most of his jobs located 50-70 miles from the office, he was thrilled to have a job so close to home. But this job would be no stroll on the rooftop.

## Ten Acres of Work, Seven Miles of Tape

Naturally, like most clients of coatings professionals, Pier 1 management needed the job done quickly – in the fall when the dew point is reached early in the evening and lingers on the roof until late in the morning, making for short workdays. “Water is the worst bond-breaker in the world,” says Boyd. “We have to let it dry before we can start spraying and applying tapes.” That meant quitting at around 3:30 p.m. to let the coating cure until the dew hit the roof, and not resuming until it dried at 10:30 or 11:00 the next morning. “If it was summer, we could work until 6 o'clock,” Boyd adds.

Because of the short days and the fact that crews couldn't do surface prep too far in advance, they reduced their normal 12-man crew to an eight-man prep and repair team and three- to four-man application team. And they worked like fiends to remove the damaged areas of the roof, which was fully adhered to rigid foam insulation that was mechanically attached to a 22-gauge steel deck.

“We spent an inordinate amount of time preparing the roof, first by power washing,” says Boyd. “Then the crews got on their hands and knees, gently scraping the loose coating to make sure we got it all off.” They used a Rahsco 4013 4,000 PSI standard power washer and a Rahsco cc8330 30-inch surface cleaner power washer,



The preparation of the new roof required the repair of more than 200 old patches (*top*), followed by a coating of a single component, moisture-cured polyurethane primer. The primer helped to enhance adhesion of the fabric-backed butyl tape that was applied along the seams. In all, Boyd crews used 35,000 linear feet, or seven miles, of seam tape.

Replacing damaged sections of the old 45-mil EPDM with 10,000 square feet of new 60-mil EPDM required several steps. First, crews mechanically attached the new insulation and then glued recover board with a low-rise foaming adhesive using an adhesive gun (*above*). The 444,400 square-foot roof contained seams around each of the 20-foot-wide sheets of EPDM, as well as around every skylight and other penetration of the rubber (*top left*). All had to be primed and taped before coating could be applied (*top right*).



which, he says, “was a godsend. It looks like a typical push-type lawnmower, with a rotating power washer underneath. It really cleaned the roof well.”

After prepping the roof and repairing more than 200 old patches, they laid down a coating of ERSystems’ Primer One, a single component, moisture-cured polyurethane. The primer was used to enhance adhesion of ERSystems’ fabric-backed butyl tape, which would be applied along the seams of the EPDM. “We used 35,000 linear feet of seam tape. That’s about seven miles,” notes Boyd. Not only were there seams all around each of the 20-foot-wide sheets of EPDM — every skylight and other penetration had required cuts in the rubber that also had to be primed and taped.

Getting all these repair materials — including 10,000 square feet of 60-mil EPDM that replaced damaged sections of the old 45-mil material — onto the roof was an ordeal in itself, requiring a Manitex 61-foot boom truck with an additional 41-foot jib. According to Boyd, crews mechanically attached the new insulation and then glued Georgia-Pacific’s DensDeck roof guard/recover board to the new insulation with ERSystems’ OlyBond 500 low-rise foaming adhesive, using its PaceCart adhesive gun. The materials were stored at the site in three 10-by-25-foot Mobile Mini storage containers, and moved around the site with a 34-foot Skytrack all-terrain fork lift.

Even though the roof was 40 feet high, safety concerns were minimal, Boyd says. “Safety is the first thing we promote when we talk to a company, and we had a preconstruction meeting with Pier 1 to talk about where we would put the ladders or if we would use interior access,” he says. “We mostly used interior access through the warehouse.” The gabled roof, which sloped downward from the center, was surrounded by a nearly four-foot-high parapet wall, so no guardrails were needed.

## The Coating that Changes Color

Coating the sloped roof of the warehouse carried its own challenges — mainly, the collection of water. “Along each 900-foot-long edge of the roof is a trough where water tends to pond,” notes Boyd. “The way we solved this and stayed within budget was to use ERSystems’ Erathane Ultra coating, a polyurethane with an acrylic-modified emulsion, around the perimeter. It is resistant to ponding water. In fact, water actually helps it to cure out and become stronger.” *Note: ERSystems does not recommend the use of water to aid in the curing process.*

The crews coated the trough areas first. Then, before beginning the process of applying coating to the main body of the roof, they squeegeed the water down the slope into the coated troughs, allowing the slopes to air-dry for an hour to an hour-and-a-half.

When the main body of the roof was dry, crews applied two coats of Eraguard 1000 conventional acrylic coating,

applied with airless spray equipment pumped by two Hennes-Johnson 4518-45:1 hy-draulic machines that pump an average of four gallons per minute. As with the Erathane Ultra, they typically applied about 2.5 gallons per 10-foot-by-10-foot square, which dried to a thickness of 20+ DFT in about six to eight hours.

“You have to keep any acrylic emulsion above 40°F while it’s wet, or it will break down the emulsion,” says Leonard of ERSystems. “As water freezes, it expands. So the crews had to stop early enough to get the initial cure before night set in. Otherwise the dew can cause blisters and bubbles in a water-based coating.”

ERSystems calls Eraguard 1000 its “winter version” of the coating because it’s specifically made with shorter workdays in mind, says Leonard. The low-VOC coating “comes out a deep sky blue, and the darker color absorbs heat and dries more quickly. It typically cuts about 40 percent off the drying time,” he says. “But you look at it and say, ‘Lord, help me — I hope this turns white.’ It contains a UV-sensitive tint that interacts with the UV energy in the sun, making it colorless. After a few hours of sun exposure, it looks like there was never any color in it.”

The coating system saved Pier 1 “at least \$1 million,” Hudspeth says. “It would have cost them between \$1.5 and 2 million to replace the roof, and the bid for this was \$560,000,” he says. “And that doesn’t factor in the big savings in energy from the white roof.” According to Hudspeth, who has been involved throughout the project, an October 2003 temperature



ERSystems’ roof restoration program allowed Pier 1 Imports to repair its existing roof without completely replacing it, using two different, moisture-retardant acrylic coatings to reinforce weaknesses in the EPDM membrane. The redo extended the life of the roof for another 15 years.



Boyd, Inc. is seasoned prep, repair, and application teams pause for a group photo.

## VENDOR TEAM

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comparison between the old EPDM black roof and the newly coated roof showed a decrease from 152°F to 89°F. Subsequent readings varied slightly, but were equally dramatic.

## Testament to Teamwork

Boyd is pleased to have made Pier 1 Imports a satisfied customer, and adds that the company was a real pleasure to work with. "The owner's attitude can make or break a contractor, depending upon what access they have — both time access and physical access — and what they are allowed to do," he says. "They made our job as easy as possible." A pre-construction meeting with Pier 1, Hudspeth, and ERSsystems reps determined the order and timing of each step.

The Boyd team had been extensively trained in using ERSsystems' program and were seasoned applicators (his lead superintendent has been with the company 23 years; his foreman 12 years). Boyd believes, however, that his crews benefited greatly from having a consultant and manufacturer who inspected the work regularly and ensured that the job was being done correctly. "Having regular manufacturer's inspections gives us confidence," he says. "When the reps and the roofers are on the job at the same time, they can really reach solutions very quickly. That's what happened on this job. And," adds Boyd, "having a consultant who knows the business really helps also."

Restored to like-new condition, the coated roof should last beyond its 10-year warranty, Boyd says. "The whiter they are, the longer they last. Darker colors age faster," he explains. "It's much better than what was there before. The owners will learn that it is a wonderful solution." CP