



PROJECT PROFILE

ELASTOSPRAY® Roofing System

30 years of severe weather resistance

What makes a building stand up to the forces of nature? Again and again and again ...

Installing Contractor

- Coatings Application and Waterproofing Co.

Building Owner

- Mississippi Coast Coliseum, a 24,780-square-foot, domed stadium

Problems

- Windborne debris from Category 4 hurricane punctured 30-year-old spray-applied polyurethane foam (SPF) roof through to metal deck, causing minor leaks
- Windborne sand scoured protective coating, causing cosmetic damage and possible long-term compromise to performance of SPF roofing system

Solutions

- Scarify the original, 30-year-old SPF roofing system
- Apply one inch of ELASTOSPRAY® polyurethane foam from BASF Polyurethane Foam Enterprises LLC
- Finish with NEOGARD PERMATHANE™ II FR protective coating
- Roof had survived over 176 days of extreme weather conditions in its 30-year history – the goal of the project was to restore the roof's long-term, leak-free performance

Advantages

- Severe weather resistance
- Minimal disruption during installation
- Renewable, seamless, self-adhering application
- Conformity to irregular shapes
- Continued leak-free performance
- Sustainability and environmental responsibility

On August 28, 2005, Hurricane Katrina made landfall at the Gulf States. On August 30, 2005, the Mississippi Coast Coliseum rose out of the rubble on the beachfront of Biloxi, Mississippi. Intact.

Hurricane Katrina, a deadly Category 4 storm, is now known to be the most devastating natural catastrophe in American history to date. Private insurer losses are estimated between \$40 and \$60 billion. Total economic losses to infrastructure, property and flood damage are estimated to be above \$200 billion¹. The estimated death toll exceeds 1,300, and more than 450,000 people were displaced by the disaster².

How, then, did the Mississippi Coast Coliseum survive almost unscathed? Was it just luck?

 **BASF**
The Chemical Company

BASF Polyurethane
Foam Enterprises LLC



A map showing the storm tracks of the hurricanes and tropical storms that have occurred in Biloxi from 1979 to 2005.
<http://maps.csc.noaa.gov/hurricanes/viewer.html>

Built in 1977, the 24,780-square-foot, 9,150-seat facility is home to the Mississippi Sea Wolves hockey team, the Gulf Coast Bandits basketball team and is the site of major concerts, dog shows, rodeos and other special events in the area. The domed stadium has had an SPF roof since its original construction 30 years ago.



photo: Alfred Benway

The Biloxi Coliseum stands strong after facing Hurricane Katrina.

It was this roof that survived the incredibly high wind speeds and devastating storm surges of Hurricane Katrina.

“I’m really proud to hear that the roof I put on 30 years ago was able to survive a storm like Hurricane Katrina,” says Dave Moening, a now-retired contractor who was part of the crew that installed the original roof on the Mississippi Coast Coliseum. “I think it says something about the workmanship and the suitability of spray-applied polyurethane foam roofing systems for buildings in coastal areas.”

Year	Storm Name	Average Wind Speed (mph)	Duration in Biloxi (days)	Category
1979	FREDERIC	105	1	Hurricane 4
1985	ELENA	103	1	Hurricane 3
1985	JUAN	60	1	Tropical Storm
1988	BERYL	37	2	Tropical Depression
1988	FLORENCE	65	1	Hurricane 1
1995	ERIN	55	2	Hurricane 1
1997	DANNY	68	2	Hurricane 1
1998	GEORGES	66	2	Hurricane 2
2001	ALLISON	37	1	Subtropical Storm
2002	BERTHA	35	1	Tropical Storm
2002	HANNA	43	1	Tropical Storm
2002	ISIDORE	55	1	Tropical Storm
2003	BILL	45	1	Tropical Storm
2004	IVAN	105	1	Hurricane 3
2005	CINDY	45	1	Tropical Storm
2005	KATRINA	95	1	Hurricane 4

<http://maps.csc.noaa.gov/hurricanes/viewer.html>

Most of the roofs in Biloxi were not as lucky or as durable as the SPF system on the coliseum.

“Not one building along the beach had a viable roof left on it except the coliseum,” says Bob Rothlingsberger of Coatings Application and Waterproofing Co., the company charged with restoring the roof after the storm. “Everything was washed away. Leveled flat. The hotel across the street from the stadium had a casino barge embedded in it.”

Despite the battering winds, the sustainable SPF system did not fail. No part of the roof blew off. Flying debris had punctured the SPF until it “looked like a pincushion” according to Rothlingsberger, yet only a few minor leaks occurred where that debris made it all the way through the three inches of polyurethane foam and into the underlying metal deck. Beach sand blown by the wind was powerful enough to scour the roof’s protective coating and create only cosmetic damage. The membrane roof on the adjoining convention center was utterly destroyed, yet the coliseum’s roof – and the building – had weathered the storm. Again.

It turns out Mississippi Coast Coliseum has a long history of surviving storms. NOAA Coastal Services Center records show 15 named hurricanes and tropical storms hitting Biloxi from 1979 to 2005 (see Table 1). The highest wind speed tracked was 115 miles per hour (mph) during Hurricane Frederic in 1979. Hurricane Katrina brought wind speeds as high as 110 mph to Biloxi.

NOAA also reports 28 severe hail events with hail stones at least one-inch in diameter, 28 tornadoes and 100 major thunderstorms with high winds in the Biloxi area between 1977 and 2006. In all, the truly sustainable SPF roof on the Mississippi Coast Coliseum has survived more than 176 recorded days of severe weather in its 30 years of service – an average of almost six days each year. Most roof systems can’t last 30 years in a gentle climate, let alone three decades of battering winds, flying debris and drenching downpours.

SPF roofing has gained recognition for its ability to withstand high wind uplift and blow off during severe weather because it offers superior adhesion to the roof deck and penetrations with no need for fasteners. There are no joints or edges for the wind to grab onto. Lightweight yet rigid and monolithic, it provides extra strength to help the roof stand up to the forces of nature.

Laboratory tests of SPF systems have measured its strength. FM Global has rated ELASTOSPRAY® roofing from BASF Polyurethane Foam Enterprises at I-255 as structural concrete recover, FM I-180 as general recover, FM I-180 over existing asphaltic BUR, FM I-180 over new structural concrete, FM I-90 to FM I-150 over a steel deck with non-combustible walls and FM I-90 over an existing Class 1 metal roof. ELASTOSPRAY systems to concrete decks have been tested by FM Global to meet the minimum requirements of Class I-375 and Class I-840. Throughout the testing reports, the failure methods noted were attributable to the deck substrates, not the foam.

In addition to its wind uplift resistance, SPF roofing technology provides key contributions to high performance including improved building energy efficiency, durability and low lifecycle cost. Because it installs directly to the existing substrate in most retrofit applications with no tear-off, it diverts thousands of pounds of waste from the landfill for improved environmental responsibility – and in hurricane zones, SPF’s speed of application can mean turning a storm-damaged roof into a veritable fortress between onslaughts from Mother Nature.

The Mississippi Coast Coliseum was not the only SPF roof to survive Katrina. In June 2006, the National Institute of Standards and Technology (NIST) released *Performance of Physical Structures in Hurricane Katrina and Hurricane Rita: A Reconnaissance Report* (www.bfrl.nist.gov/investigations/pubs/NIST_TN_1476.pdf), a documentation of damage to major buildings, infrastructure, and residential structures resulting from wind and wind-borne debris, storm surge, surge-borne debris and surge-induced flooding. SPF roofs scored well above the average when it came to weathering Katrina and Rita.



**BASF Polyurethane
Foam Enterprises LLC**
13630 Watertower Circle
Minneapolis, MN 55441
Phone: 1-888-900-FOAM
Fax: 713-383-4592
www.basf-pfe.com
spfinfo@basf.com

363-3179

The NIST report states:

“A number of spray polyurethane foam (SPF) roofing systems were observed . . . Some of these roofs were estimated to be about 20 years old. With one minor exception, all were found to have sustained Hurricane Katrina extremely well without blow-off of the SPF or damage to flashings.”

That proven severe weather resistance inherent to well-installed SPF roofing systems is what allowed the Coast Coliseum to withstand Hurricane Katrina. In the days immediately following the catastrophe, the facility was used as an emergency shelter.

As the days passed, the Federal Emergency Management Agency (FEMA) used the coliseum as a staging site for its disaster relief efforts. A task force from the Indiana Department of Homeland Security took up residence on September 5, 2005 when it arrived to assist with the recovery. The Canadian Navy stopped by to assist with debris removal. The rescue efforts in Biloxi were all operating out of the Coast Coliseum.

When the time came to pay attention to those few nuisance leaks that were the sum of the damage to the roof, Coatings Application and Waterproofing Co. was encouraged by BASF Polyurethane Foam Enterprises to bid on the project. Already working on restoring a shopping mall down the road from the stadium, Rothlingsberger and his crews knew the extent of the damage to Biloxi and were keen to help restore the Coast Coliseum.

“You had to be there to believe the scope of the destruction to the area,” he says. “They had so little left. There were no hotels, so we had to buy campers and live in the parking lot for the duration of our projects there. I thought the crews would lose morale living that way for seven months, but they all bonded together and really put everything they had into helping the city and its residents get back in action.”

Rothlingsberger and his team performed a careful assessment of the damage to the coliseum’s roof, and then set to work on the repairs. One-half-inch of the original polyurethane foam was scarfed down and removed, and then a fresh application of one-inch thick ELASTOSPRAY spray-applied polyurethane foam was installed. The project was

completed with a NEOGARD PERMATHANE™ II FR protective coating membrane.

Throughout the restoration, the crew had to endure record rainfall in the area that caused several delays. The ongoing presence of FEMA personnel meant a very full parking lot and extra consideration to prevent disruption to ongoing activities. To top things off, the Coast Coliseum had reopened for business.

“We had an American Kennel Club dog show, a rodeo, a motorcycle show and even a ZZ Top concert to work around,” says Rothlingsberger. “It was important to get the installation done without interfering with the events at the facility.”

Based on the performance of the existing SPF roof, Rothlingsberger expects the new roof to be able to stand up to almost anything.

“Spray-applied polyurethane foam is the ultimate sustainable system for a domed roof,” he says. “Let’s remember that there’s still two inches of the original foam on the coliseum’s roof. All we did was give it a good renewal. It should last for a few more decades now.”

The city of Biloxi is on the road to recovery after the devastation of Hurricane Katrina, thanks in large part to the efforts of those like Coatings Application and Waterproofing Co. that traveled far from their own homes to pitch in and lend a hand.

“I lived in Homestead, Florida when Hurricane Andrew hit back in 1992. I know what it’s like to wake up to that kind of devastation, to realize everything you owned is destroyed. Without help from the outside, you can’t make it through,” says Rothlingsberger. “It makes me proud to know we were able to help here in Biloxi.”

SPF has proven itself – time and time again – to be among the strongest and most resilient roofing systems on the market. It withstands hurricanes, thunderstorms, tornadoes and hail. It lasts for decades. It saves energy and the environment. It installs quickly and cost effectively.

Contact BASF Polyurethane Foam Enterprises to specify the ELASTOSPRAY roofing system for your building.

¹ *Hurricane Katrina: Insurance Losses and National Capacities for Financing Disaster Risk*, Rowle O. King, Analyst in Industry Economics, Government and Finance Division, Congressional Research Service.

² *Summary Report on Building Performance, Hurricane Katrina 2005*, Federal Emergency Management Agency 548/April 2006.

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