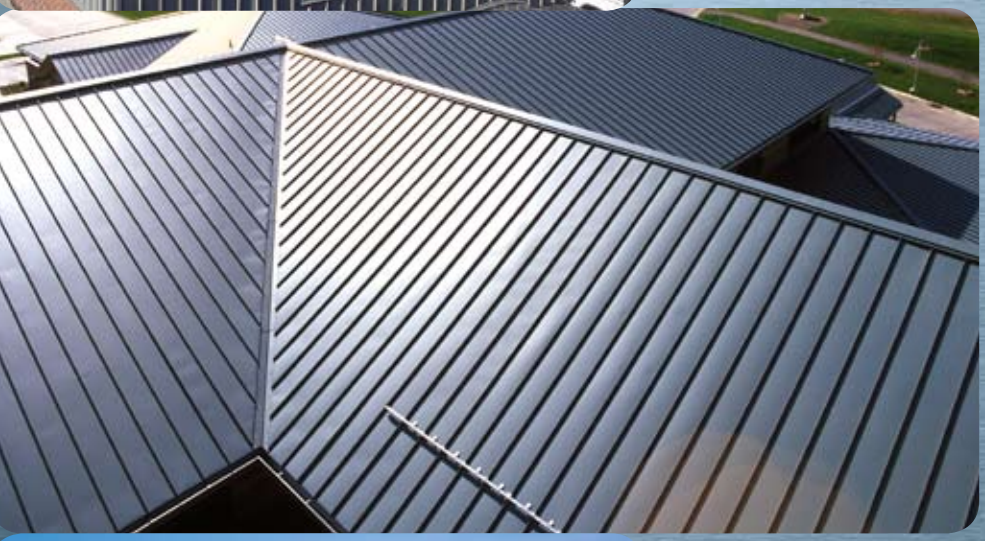


CASE HISTORIES IN ROOF SYSTEMS

BUTLER®

CONTENTS

CASE HISTORIES IN ROOF SYSTEMS

NEW LIFE FOR 50-YEAR-OLD GARAGES

A creative re-roof rescues school bus buildings

The school buses in the Raytown, Missouri, C-2 District transport more than 5,000 students per day and log over 700,000 miles per year. By parking the buses inside, safe from vandalism and weather, the district saves about $90,000 annually.

But by early 2003, the two garages sheltering its 67-bus fleet appeared to be beyond repair. RTI Consultants, of Overland Park, Kansas, was brought in to evaluate the 50-year-old structures. With a roof retrofit by Strickland Construction, a Butler Builder® in Olathe, Kansas, decades were added to the lives of the buildings.

Each garage had a roof composed of three barrel vaults covered with uninsulated corrugated metal sheathing, suffering from chronic leaks and deterioration. "You could see daylight in many places from inside the bus bays," says Michael Richardson, the school district's director of buildings and grounds.

The situation was urgent because the buildings—28,700 and 21,230-square feet respectively—also include offices, a maintenance shop and storage. "We had a really bad situation whenever it rained. We couldn't store anything on the floor that was vulnerable to water," Richardson says.

There were other problems as well. The primary framing for the garage roofs consisted of war-surplus steel bow-trusses supported by concrete block walls. The arched trusses, aligned side-by-side across each building, created flat valley gutters above each load-bearing wall. The metal sheathing covering the roof was fastened to the secondary wooden supports, some of which also were deteriorating.

After examining the roof and structural conditions, RTI recommended installing a new MR-24® standing seam roof system over the existing roofs. "The retrofit was far more cost-effective than building something new," Richardson observes.

First, the barrel-vault profiles were altered to a pitched, double-slope configuration. Strickland Construction welded "piggyback" frames made of H-section beams and columns to the underlying original trusses. The new framing columns were stepped to create sloped supports for the new roof panels. The open wall space around the perimeter of the buildings between the new and old roofs was enclosed with a Shadowall® wall system.

Construction began in February, when the weather was at its worst. Retaining the old roof sheeting was not just economical, explains Glen Richardson, president of Strickland Construction. "Because the original roof stays in place during the retrofit, the building stays dry and warm while we're working on it," he says.

The first building was re-roofed without complications. But when the crews started on the second building, they discovered that its trusses had never been fastened to the concrete block walls. RTI Consultants, Butler engineers and Strickland Construction quickly resolved the situation by using full-height H-section columns extending from the garage floor to the height of the new piggyback frames.

The retrofit also added vapor barrier insulation to the unheated bus bays to guard against condensation, and added insulation with a value of R-20 above the offices.

Strickland Construction completed the job before the April 15 deadline, and Michael Richardson says the school district was very pleased with the retrofit process: "We had absolutely no problems from start to finish. It was very professionally done," he says.

"The retrofit fully restored the integrity of our buildings. It has impressed our patrons—our taxpayers—because we're maximizing use of our resources. With the new roofs, these buildings could easily serve the district for a long time to come."

RAYTOWN SCHOOL BUS GARAGES

Butler Roof Dealer®: Strickland Construction Company, Olathe, Kansas
Size: 49,930 total square feet
Butler® Systems:
MR-24® standing seam roof system
Shadowall™ wall system

New Productivity

How to bring a handful of leaky, outdated buildings under one roof

from an Aging Property

Four existing buildings of differing ages and eave heights, some with leaking roofs and little insulation, were united by employing a number of Butler® building systems and an MR-24® standing seam roof system. This increased the company's manufacturing space from 48,000 square feet to 65,000.

Pedersen Power Products faced leaking roofs, an inefficient layout, low eaves and no room for much-needed cranes. The question—what to do: Rebuild? Relocate?

Butler Builder® Steve Christensen of Estherville, Iowa, had a better, far less-expensive idea. He suggested they re-roof.

Pedersen moved to its location in Omaha, Nebraska, in 1974, and its plant had grown to include four major structures comprised of about 10 conventional and steel buildings. Three of these were 30-40 years old with screwed-down roofs that were leaking and had little insulation. Three others had built-up roofs in dire need of repair. Alleys about 40 feet wide ran between the structures.

"In Omaha, it gets to 102° in the summer and in the winter it gets to 40° below with 2 or 3 feet of snow," says Pedersen General Manager Mike Niedzwiecki. "Often, we'd have to spend two or three hours to clear paths just so we could get from building to building. It was a real pain. We get rain here, too, and the roofs leaked. When it dried out, we would go up with a can of tar and try to plug the holes."

In business since 1948, Pedersen fabricates medium-voltage, metal-clad electrical switching gear and relay control panels used by municipalities and power companies. "We build the equipment to make sure the lights in your house stay connected to all the public utilities. Essentially, we build the metal buildings you see at power substations," Niedzwiecki explains. "We have contracts all over the United States."

Christensen's company, Christensen Construction and Design Co., had built a couple of Butler® buildings for a Pedersen sister company in Sibley, Iowa. He was called in for ideas to improve the Omaha situation. "What they wanted to do at first was to connect two of the structures to improve their material flow," says Christensen. "But after spending the day there, it was obvious that they needed to have the entire complex under one roof. This would eliminate the myriad of roof heights, roof slopes and leaks—and, at the same time, eliminate the alleys to expand floor space and solve the need to transfer materials between buildings."

Christensen went back to his computer and got to work. "The Butler Advantage® XE software system allows us to infinitely adjust eave heights and roof pitches," he says. After entering extensive measurements and examining the options, he determined it was possible to fill in two of the gaps using the Widespan™ structural system and another using the Landmark™ 2000 structural system. The new eave heights would allow him

FOR AN AGING PROPERTY

Pedersen General Manager Mike Neidzwiecki appreciates the advantages of the building's increased eave heights, which allowed room to install cranes and add insulation for greater energy efficiency.

to use a slope build-up re-roof system with an MR-24® standing seam roof system to create one large roof plane and one massive building.

Christensen's plan gave Pedersen the flexibility to complete the conversion in phases, but the company's executive committee wanted to proceed at once. "We were very excited about what he proposed, and pretty much gave him a purchase order that day," says Niedzwiecki.

The Landmark 2000 system was used to create a 40-foot bay to accommodate a crane that would run 235 feet through the renovated structure. "The Landmark truss purlins were perfect, eliminating the need for interior columns in that area and keep the roof slope in the right direction," says Christensen.

He used the Widespan system to connect a 35-foot by 60-foot gap between existing structures and help create the roof plane needed to unite the buildings. He used the system again in another 60-foot by 156-foot area between other existing structures, allowing a second internal crane to be installed. This also completely enclosed one of the old steel buildings, which was removed later to open up the space vertically and horizontally.

"The most important aspect of this project was not to interfere with their operations," Christensen says. "By carefully dropping the new columns through the old roof and outside the parameters of the old walls, we never interrupted production while the new building was being built. The old building was removed over a weekend and production never missed a beat."

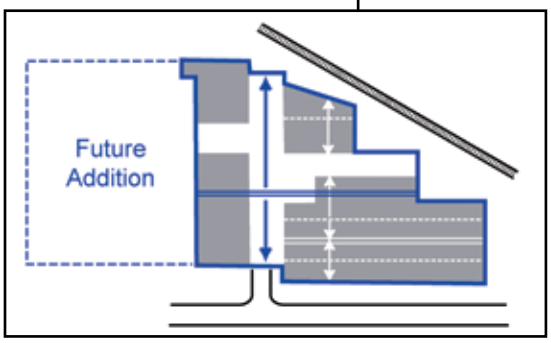
"There was no time lost during construction," confirms Niedzwiecki. "It was very well organized and everything was well engineered. There were minimal problems."

PEDERSEN POWER PRODUCTS

Butler Builder®: Christensen Construction and Design Co., Estherville, Iowa
Size: 65,000 square feet
Butler® Systems:
Butler Advantage® XE software system
Landmark™ 2000 structural framing system
Widespan™ structural framing system
Butlerib® II fascia system
Slope build-up re-roof system

"Only Butler has the broad product line and engineering expertise to tie together something like this"

STEVE CHRISTENSEN



Christensen used a 5-foot Butlerib® II fascia system to close the wall space between the old roofs and the new, higher roof planes. "The following spring, we repainted the old wall panels to match the Butler® colors," says Niedzwiecki.

The gap between the old and new roof systems also served to lower energy costs. "In addition to the new roof insulation, we now have an air space—a void of a foot to 5 feet—between the roofs. It's been really helpful with the heating and cooling bills," says Niedzwiecki. He adds that the higher eave heights—from 15 to 22 feet—also help keep the manufacturing areas cooler.

"We used thermal blocks over the new roof purlins as well. That also helped reduced energy costs," Christensen says.

The re-roofing project took only about two months at a cost of $570,000—much less than rebuilding or relocating—and greatly increased the value of the property. The new roof design also gave Pedersen an option to add a 250- by 200-foot addition off the gable end on the only remaining available land.

Plus, Pedersen qualified for tax-increment financing from the city of Omaha—allowing the company to spread its tax liability over a number of years.

By going from 48,000 square feet to 65,000, the company increased its manufacturing capacity. "When Steve started this project, we had room for fewer than 30 people in manufacturing. Now we have 80," Niedzwiecki says. "We were able to increase our volume from our previous annual average of $8 million to $9 million. This year, we're projecting $26 million."

"This project showed what Butler is all about," says Christensen. "Only Butler has the broad product line and engineering expertise to tie together something like this."

Pedersen continued the renovation work at the rejuvenated plant, cleaning up and repainting inside and out. "Our employees love it—it's so nice and bright," says Niedzwiecki. Management is pretty pleased with it, too.

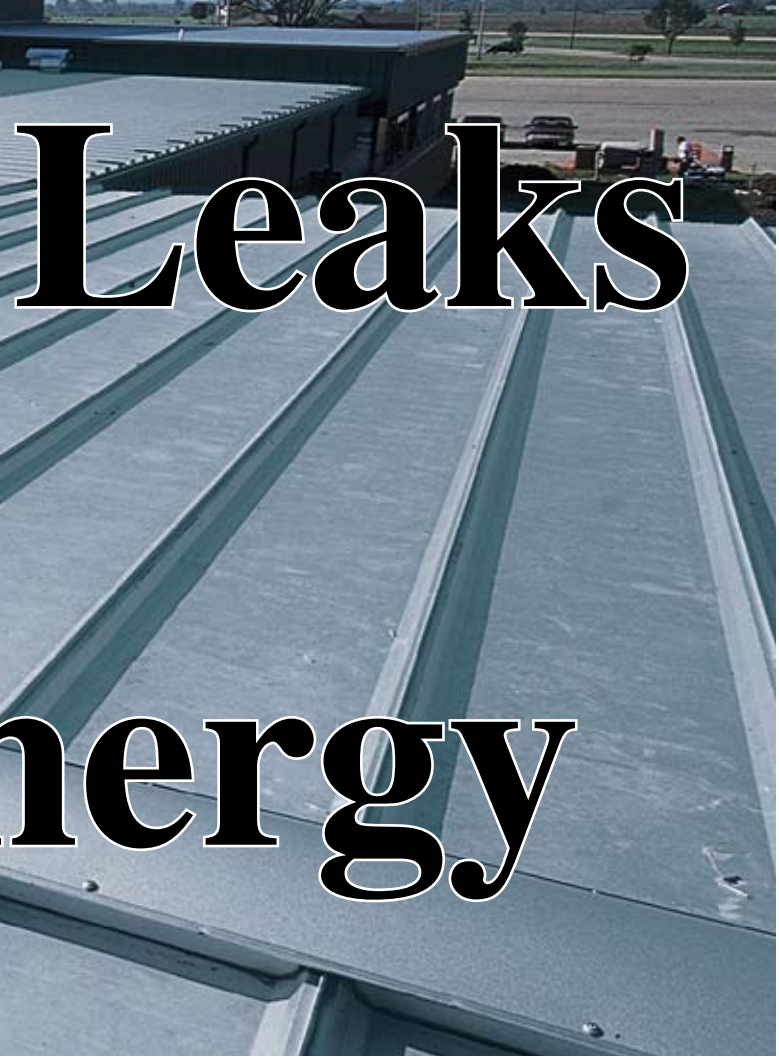
"Another building nearby that we're using as our receiving area is probably about 20,000 square feet. It needs a new roof, and I know what we'll be putting on it," Niedzwiecki says.

"We'll do the same thing we did here—no doubt about it!"

The plan (top left) and photos above show how the four original buildings were combined into one large, efficient plant. On the plan, the original buildings are gray, and the arrows show the slopes of the new (blue) and old (white) roof systems.

Stopping and Saving En

Central Lee re-roofed and re-sided its existing building, built a new wing, and installed a new geothermal heating and cooling system. The project is shown in progress with the new MR-24® roof system installed in the large photo, top of page. The completed building, with its new wing and new wall panels, is shown above.



Leaks

nergy

Project manager Travis Benz (left) and Superintendent Joe Crozier

An innovative re-roof was just the start for this school renovation

The roof on Central Lee High School, near Donnellson, Iowa, was beyond repair.

"Our school was built in 1962, and our roof had been replaced only once. We were not sure it could make it through another year," says Superintendent Joe Crozier.

"There were lots of leaks. The old roof membrane was actually pulling away from the edges."

Once the school district began fundraising for a new roof, however, it didn't stop there. It raised enough money to put in an all-electric geothermal heating and cooling system and build a slick new 10,500-square-foot addition, including a computerized, fiber optics-linked learning center. This would serve adults in the evenings as well as Central Lee's 385 students during the day. Any dollars remaining in the $2.75 million budget would be applied to a list of extra needs—including furnishings and equipment for the addition and replacing the old building's uninsulated wall panels (see page 11).

To handle this ambitious project and ensure that its funds would reach as far as possible, the school interviewed five construction management firms and took proposals from three of them. They selected the Des Moines (Grimes, Iowa) office of Septagon construction Co. Inc.—a Butler Builder® and subsidiary of Septagon Industries, a construction and management group based in Sedalia, Missouri.

"They had the most experience with school projects, and we felt confident that they could provide the kind of service and leadership we needed," says Crozier. A second experienced firm, S.G. Construction Co., Inc., a Butler Builder in Burlington, Iowa, was chosen as the roofing and erection subcontractor.

Because the school's needs were urgent, construction was scheduled to begin in October and continue throughout the school year.

Septagon planned to cover the existing building's flat 50,000-square-foot roof—a 40-year-old

"I think that having a new, long-lasting roof system is probably what's pleased the people in our school district the most."

JOE CROZIER

single-ply thermoplastic membrane with gravel ballast—with a double-sloped MR-24® standing seam roof system. To do this, they would normally remove the gravel, through-fasten a Butler® slope build-up system to the existing roof supports and install the new roof system over that.

When S.G. Construction's crew examined the roof, however, they found the standard fasteners would not penetrate far enough. "Our drawings had not been updated when the original roof was replaced, and there was much more insulation up there than we expected," Crozier explains.

The insulation, which was Styrofoam, increased in depth towards the roof's center. "We were told to expect 6 inches," says Fred Peterson, S.G.'s roofing foreman. "It was 14 to 16 inches deep in spots."

CENTRAL LEE HIGH SCHOOL

Butler Builder®: Septagon Construction Co., Grimes, Iowa (construction management): S.G. Construction Co., Inc., Burlington, Iowa (erection and roof)
Architect: SVPA Architects, Inc., Des Moines, Iowa
Size: 50,000 square feet re-roof; 10,500 square feet classroom addition
Butler® Systems:
Widespan™ structural framing system
Shadowall™ wall system
MR-24® standing seam roof system

The cost of removing the hauling away the old roof materials and then installing new insulation would be prohibitive. And providing adequate temporary weatherproofing during the process would be almost impossible.

Septagon conferred with the Butler Roof Group. The solution was to re-engineer the job—removing the gravel ballast as usual, then building an innovative "piggyback" frame of tapered beams and Z-purlins over the existing roof, and installing the MR-24 roof system over that.

To keep added costs as low as possible, plans for the roof on the new addition changed as well. "We were going to use a gabled MR-24 roof system," says Travis Benz, Septagon's project manager. "But in our cost-savings analysis, we changed the roof pitch to a single-slope."

After a delay of two months, the re-roof began in December. The huge piggyback frame would be supported by 3-inch-square vertical pipe columns sunk through the existing roof materials and welded to the beams directly above the building's own columns.

"Around 200 pipe columns were required, " says Ron Massner, vice president of S.G. Construction. "First, we had to cut through the insulation, then through 3 inches of the original roof."

"Everywhere there was a building column, we had to make an exploratory hole in the roof to find it," adds Fred Peterson. "But we had to cut no more than we needed to, because we had to patch each penetration to prevent leaks."

Once the building columns were located, the roof holes were enlarged just enough to allow the pipe columns to be welded in place—a difficult job in such deep, narrow openings. The holes were then stuffed with insulation and capped with domes of galvanized tin, caulked in place to keep out moisture until the new roof was completed.

THE PROJECT AT A GLANCE

With judicious construction management and the economies of systems construction, Central Lee High School was able to achieve all of the following within its $2.75-million budget:

- Complete re-roof of the school's existing 50,000-square-foot building
- New 10,500-square-foot classroom addition/adult learning center—with computerized, fiber optics access to a statewide program of educational classes for both students and adults
- Geothermal heating / cooling system with 24 groundwater-source heat pumps
- High-efficiency lighting system, additional air conditioning and modifications to support educational technology enhancements
- Complete replacement of the exterior wall panels and windows for the existing building
- 60-space parking lot
- 1,200-square-foot framed, roofed structure, ready to be turned over to the school and completed by the students as an agricultural lab/shop

Donnellson fortunately experienced a mild winter, but the temperature dipped abruptly one day, creating a crisis. An 80-foot crack opened in the old thermoplastic membrane. "We had to seal it up in a hurry," Peterson recalls. "The forcast that day was for snow or sleet."

Despite the tedious work involved and te time lost in the re-design, S.G. Construction finished the re-roof in about two months—right on schedule. "Their foreman was under a lot of stress. He did an outstanding job for us," says Crozier.

When standard fasteners could not penetrate the thick Styrofoam insulation on the existing building's roof, a special framework had to be built above it to support the new standing seam roof system.

Under Septagon's efficient management, the school also had sufficient leftover funds for all the extras it had envisioned, including tearing out and replacing the existing building's exterior wall panels with an insulated Shadowall™ wall system to match the new addition, and installing new windows as well. "We originally thought we'd have enough money to just cover up the old walls. Now we have a 40-year-old building that has been almost completely renovated," Crozier says.

With this step, the entire school now has walls with an insulating value of R-19. the original building, which received an additional 2 inches of fiberglass batt during the re-roof, has an insulating value of R-40, and the roof of the addition has a value of R-30.

This energy-efficient envelope will help lower overhead for years to come. And the school's new geothermal heating and cooling system and high-efficiency lighting system have already started to pay off, in an estimated $165,000 in rebates from its local utility company.

"Our school board is extremely happy with the project—with Septagon and its leadership, and with the way everything has worked out." Crozier says.

"The new addition is fantastic. It's going to be a great facility for our community. But I think that having a new, long-lasting roof system—one that isn't going to be leaking five years from now—is probably what's pleased the people in our school district the most."

The old uninsulated exterior wall panels on the existing building were removed and insulation was installed (left). A Shadowall™ wall system, was then installed to match the new addition (above).

AN AFFORDABLE 418,000-SQUARE-FOOT RETROFIT

Waterloo Industries knew the time had come to replace the original roof on their manufacturing facility in Sedalia, Missouri. The issue was how to fit the costly project into a lean budget.

Founded in 1922, Waterloo Industries' international headquarters is located in Waterloo, Iowa. The company manufactures metal and plastic tool storage products for consumer and professional markets around the world. The Sedalia plant is one of three producing more than 2,500 products.

"We decided to undertake the roof project because the building was nearing 25 years old. We had started to have a number of problems with roof leaks," says Joe McBride, the Sedalia plant's maintenance and facilities manager. "We had suffered some damage to product and to some electrical equipment. We also had had some potential safety problems with water on the floor."

Septagon Construction Company, a Butler Builder® in Sedalia that had built the original plant and two later additions, provided the perfect solution—an MR-24® metal-over-metal standing seam roof system. The building's original roof system, an older generation of product, had outlived its usefulness.

"We devised a plan to do the work in phases—based on square footage and curbs*— that would allow Waterloo to fit it into their budget over three years," says Rick Schlesselman, Septagon's roof services manager.

"Most manufacturers have a fixed budget. For them to consider a re-roof project, especially when they're looking at a large job such as this one, you have to show them that it is a long-term investment," says Schlesselman. "With a cheap fix, you only end up going back and having to fix it again. When you can eliminate all the problems completely with a retrofit and stage it to depreciate the cost over several years, it just makes sense to re-roof and avoid damage to your goods and your building."

Waterloo agreed. They appreciated the 25-year weathertight warranty on the MR-24 roof system.

**** Curbs are weathertight flashings/supports for large fans and vents.***

AN AFFORDABLE

418,000-SQUARE-FOOT RETROFIT

"The price of the MR-24® system was extremely competitive with any other choices we had looked at"

JOE MCBRIDE

With 418,000 square feet to re-roof, Waterloo Industries' Butler Builder® did the job in three budget-friendly phases. The MR-24® metal-over-metal roof system installed easily over the existing roof.

"Also, the price of the MR-24 system was extremely competitive with any other choices we had looked at," says McBride.

They trusted their contractor as well. "Septagon has earned our business by providing quality products and service that always meet our expectations," McBride says.

Because the new roof system could be installed directly over the existing roof, work below continued without interruption. "We hardly were aware that they were here," McBride adds.

Septagon finds the metal-over-metal retrofit system an ideal solution for this reason. "The alternative is to remove the roof and insulation. With that, you expose the work environment to the ambient elements. We have had customers ask us for comparative prices for both; it is invariably less costly to install the new roof over the old one."

WATERLOO INDUSTRIES

Butler Builder®: Septagon Construction Company, Sedalia, Missouri
Size: Three-phase project— 418,000 square feet total
Butler® Systems:
MR-24® standing seam roof system

The first phase, completed in 2001, encompassed 137,130 square feet and 23 curbs. The second phase, undertaken in the winter of 2002-03, involved another 129,000 square feet and 14 curbs. Because of the size of the building (950 by 440 feet) and the scope of the project, a helicopter was employed to stage the 40-foot crates of steel for the first two phases. "We had to do it when Waterloo was shut down because we couldn't have people

"F.M. Global has very stringent standards for roof systems and the MR-24® roof system meets those standards"

JOE MCBRIDE

in the building during that process," Schlesselman explains.

"They worked around our production schedules and were able to stage the steel on the roof when production was not scheduled on the weekend," says McBride. "They had a full ground crew that worked with the helicopter service and another crew on the roof that unloaded the crates. Through each phase, the actual staging of materials only required about four hours."

All three phases progressed smoothly, with few challenges for Septagon's crew. "The MR-24 roof system went on well and each phase of the project was completed right on or a little before schedule," McBride recalls. Septagon completed the job in October 2003, adding another 39,600 square feet and 17 curbs.

Waterloo is delighted with its new roof system and confident that it was the right choice. Before going ahead with the retrofit, the company also looked at the insurability of the MR-24 system. "One of the primary reasons we selected it is that it is accepted and approved by F.M. Global Insurance, our insurance carrier. That was a big plus for us," says McBride.

"F.M. Global has very stringent standards for roof systems, and the MR-24 roof system meets those standards. An F.M. Global engineer came out and inspected the roofing project through each phase to make sure the system had been properly installed—they were that concerned about it," he says.

"Looking back, if we had to do this project again, we would do it the same way. We feel the project has been a total success," McBride continues. "We want to take this opportunity to thank Septagon and their fine crews for a job well done. We now have more than 400,000 square feet of completed roof—and not a single leak."

A big advantage of the metal-over-metal retrofit was that the new roof panels could be installed right over the old while production continued at the plant. Joe McBride (above), the plant's maintenance and facilities manager, was also pleased that the contractor could work around the company's production schedules while staging the steel prior to the installation.

The Right Roof System for a Million-Square-Foot Retrofit

Pemco Aeroplex, built in 1943, needed to install almost 27 acres of new roof—with no interruptions to its production schedule

"This is the biggest roof job we've ever done," says William H. McGuire, P.E., president of RCI Contractors & Engineers Inc. in Tuscaloosa, Alabama. It's no wonder. Re-roofing the Pemco Aeroplex facility in Birmingham, Alabama, was a far bigger project than most builders ever see.

The Pemco facility is basically 10 airplane hangars connected by adjoining firewalls. Each hangar measures 160 feet wide by 725 feet long, "a big, open box with doors at each end," according to Steve Hoyt, Pemco director of facilities support. Each hangar can accommodate five to six airplanes the size of a Boeing 737. At any one time, the building may house 50 jets.

RCI, a Butler Builder® in Tuscaloosa, installed an MR-24® standing seam roof system on the entire building—a total of 1.175 million square feet. That's almost 27 acres of roof.

The U.S. War Department built the original facility in 1943. At the height of World War II, the government needed an airplane manufacturing plant to supplement the country's main supplier near Detroit. After the war, the building was deeded to the city of Birmingham and converted to civilian use in 1952. Precision Standard Inc., Pemco's former owner, took over the operation in 1989. Now a subsidiary of Pemco Aviation Group Inc., Pemco Aeroplex's primary mission is to service and maintain military aircraft for the U.S. Air Force.

"It was an amazing thing they did," Hoyt explains. "This whole area was swamp. They came in and drained it, trucked in millions of tons of dirt and backfill, and built this elaborate facility in less than 18 months. It was built as a temporary structure to help the war effort and it's still standing today."

But the roof, a bituminous built-up model, had definitely seen better days. Parts of the roof decking had seriously deteriorated and leaks had appeared over critical parts of the Pemco operation. "It was way, way past its economical

"Production interruptions are virtually intolerable—we had no interruptions as all."

STEVE HOYT

Each of the 10 connected hangars making up the massive facility can hold five to six planes the size of a Boeing 737.

These three photos (above and below) show stages in the re-roofing of one of the facility's three service bays. Above, the roof area is shown before a slope build-up structure is added for better drainage.

In the photo to the left, the slope-build-up structure has been added, ready for the new roof panels. In the photo below, the new panels are in place. The groove running through the center of the recessed area is a new gutter to drain the area.

life-span," Hoyt says. "We were trying to do what many owners do—patch this section, patch that section, and we weren't getting anywhere. It was clear that we just had to replace it."

Hoyt conducted a cost-benefit analysis, carefully weighing several options, including another bituminous surface and an EPDM roof liner system.

Following the government's strict procedures, Pemco solicited proposals for 3 roof system options. "RCI came through," Hoyt says. "They just had an excellent proposal. In the final analysis, a good standing seam roof system looked like the best bang for the buck," he says.

But the type of roof was not Pemco's only concern. Other significant factors were the logistics and expense of removing the old roof, the repair of corroded roof decking, potential disruption to service, and the safety of the airplanes and the 1,500 employees.

RCI started the project in February 2000, after signing a 30-month contract. The timing was based on the need to budget the $4.3 million package. But once the project began, increased funding allowed RCI to speed up the process and finish the job in March 2001.

Rodger Russ, RCI's project manager, first tackled the leaks over the office areas. Pemco had experienced bad drainage and leakage problems over three service bays totaling 130,000 square feet. RCI's solution involved changing the roof's slope, directing water to a gutter in the middle of the roof sections. Extensive slope build-up accomplished the reconstruction.

"It's unusual to change the whole roof design like that," Russ said. "Most of the roof already had a 1/4:12 slope buildup. We had to install new structurals on the whole roof, but in that area we changed the slope completely."

Another unusual approach allowed RCI to cut labor costs significantly. Erector Jerry Foley of J.W. Enterprises created a roller system that allowed workers to move materials more quickly and efficiently.

"On a building that's 725 feet long, we can set two bundles of panels down and two guys can shoot the whole length of the roof in a matter of minutes. By doing that, we don't need all the labor

UNTOUCHED BY A TWISTER

During the Pemco Aeroplex re-roof project, a tornado touched down at the construction site, tearing a 22,000-square-foot roof off an on-site warehouse and standing it up amidst some trees.

At the time, RCI had about 30,000 square feet of MR-24® standing seam roof system*, installed without trims, on the main facility.

Although the damaged warehouse, which had been roofed with another manufacturer's components, was just 100 yards away, the new roof on the main building survived the twister with minimal damage. "All we had was one wrinkled panel that had been tied down to be installed the next day," notes RCI project Manager Rodger Russ. "It was unbelievable."

*The MR-24 roof system carries the highest wind uplift ratings (Class 90) awarded by Underwriter's Laboratories, and meets the wind uplift standards for Dade County, Florida—a high-velocity hurricane zone.

"We're no just getting a new roof—we're getting a whole new system"
STEVE HOYT

The detail photo left shows a close-up of the new gutter running through the center of one of the service bay areas. No welding was allowed on the roof during the retrofit. Welds were factory made.

To cut labor costs, the erector created a roller system that allowed workers to move materials across the roof quickly and efficiently. The platform shown below carried bundles of panels to the roofers in minutes.

just to tote panels," Russ explains. "On average we were sheeting 22,000 to 24,000 square feet a day, but on our best days, we were sheeting 31,000 square feet a day—that's a huge number."

RCI also streamlined the operation by fabricating 26-foot-long man baskets that were lifted by forklift instead of manlift. "One man can walk 26 feet back and forth and hang whole pieces of trim at a time," Russ adds. "With a project this large, the cost of doing this pays for itself in a week."

As a government contractor working with valuable military equipment, Pemco had many strict requirements. First, the entire facility had to remain open throughout the job. "We're not unlike any other company; production interruptions are virtually intolerable," Hoyt explains. "RCI was very cooperative. We had no interruptions at all."

Pemco also banned welding on the rooftop. The combination of old, flammable building materials and jet fuel made for a potential disaster. RCI solved this by having KCC International (formerly Kentuckiana Curb Co.) fabricate 1.24 miles of 18-gage stainless steel interior gutter in 50-foot lengths, testing the welds in the factory and eliminating any field welds.

Pemco was delighted with RCI's performance. "The quality of installation is excellent," Hoyt says.

He also expects to see a significant drop in maintenance costs. "The new MR-24 roof system stopped further corrosion, all the leaks, and gave us a perfectly dry manufacturing operation. Short of unforeseen events, natural disasters or our not doing a good job of taking care of it, I fully expect it to last at least 20 years with no problems.

"We're not just getting a new roof—we're getting a whole new roof system. We can stand back with pride and say, 'Yeah, this is fantastic!'"

PEMCO AEROPLEX

Butler Builder®: RCI Contractors & Engineers Inc., Tuscaloosa, Alabama
Size: 1.175 million square feet
Butler® Systems:
MR-24® standing seam roof system
Slope Build-Up System

The Right Roof System for a Marine Environment

Located on Florida's west coast, Mote Marine Laboratory needed corrosion- and wind-resistant roof systems for its new buildings and renovations

Visitors enjoy Mote Marine's outdoor shark tank much more in the shade of its new, open-sided roof canopy. Both the canopy and its skylight are insulated—for added comfort in a tropical environment.

"We're in a very humid, salt-laden environment, and we certainly needed a roof system that could withstand the environment down here," observes Dan Bebak.

Bebak is director of the aquarium division of the internationally known Mote Marine Laboratory & Aquarium complex on City Island in Sarasota, Florida. He has jurisdiction over many of the buildings the scientific research facility has built or renovated over the past 10 years. Topping off this new construction is around 49,600 square feet of metal standing seam roof systems.

While metal may seem an odd roofing choice for a coastal location, the roof systems used at the Mote complex are MR-24® and CMR®standing seam roof systems. These are made of unpainted Galvalume* panels that have withstood more than 20 years of punishing conditions on carefully monitored installations around the U.S. with virtually no signs of leaks or corrosion.

There was another reason to use these roof systems, observes Mike Vernoy, project manager for Mote's contractor, Willis A. Smith Construction, Inc., a Butler Builder® in Sarasota. They pass the toughest wind uplift codes and specifications, including those for Dade County, Florida—hurricane country. "Sarasota is in a high-velocity hurricane zone too," he says. It just didn't make sense to recommend anything else."

The most recent Mote projects completed by Willis A. Smith are a new 43,000-square-foot, three-story aquarium/administration building, which connects older lab and educational buildings on one side with an older aquarium building on the other, the re-roof of the older aquarium building itself, and 31,600 square feet of open-sided canopies attached to these buildings. One of these—a dramatic, 23-foot-high canopy with a 24- by 24-foot insulated glass skylight—now covers one of the complex's most popular public attractions, an above-ground shark tank.

Mote is first and foremost a prominent research facility specializing in the study of sharks and other areas of marine and coastal biology (see "More About Mote"). But it also has an important public and educational side. Around 400,000 people visit the facility annually. The paved courtyard surrounding the shark tank is used for hosting fund-raising events as well as educational demonstrations for school groups and tourists.

Mote's new administration building, completed

Corrosion- and hurricane-resistant standing seam roof systems have been used for new and retrofit construction at the Mote facility for the past 10 years. The pre-engineered administration building above provides a focal point for visitors and provides access to exhibits in the older aquarium building to its right. Below, a new canopy covers a "lagoon" in the visitors' area outside.

"Sarasota is in a high-velocity hurricane zone—it just didn't make sense to recommend anything else"

MIKE VERNOY

by Willis A. Smith in 1999, provides a focal point for the center, which consists of seven buildings on a 10.5-acre campus. The ground floor is given over to aquariums and exhibitions, with a public lobby and gift shop for visitors. A maintenance shop at the back also provides space to build exhibits. The second floor houses administrative offices, a research library and Mote's extensive computer center. A third floor—presently empty—is expected to hold additional laboratory space and offices.

The newest canopy structures tie into this building and wrap around and extend behind the older aquarium building. These canopies have a Widespan™ structural framing system that was designed to eliminate rod bracing and allow unobstructed views. "Butler engineered bracing in the columns so they are rigid and won't move, and we put in mammoth foundations with 8.5-inch anchor bolts per column," Vernoy explains.

The canopy roofs have an insulation value of R-19 to avoid transmitting radiant heat, and are finished underneath with Butlerib® II soffit and ceiling panels for a trim appearance.

Before the new canopy structures were installed, the older aquarium building had a more limited system of high-maintenance vinyl-covered canopies. The new canopies are a vast improvement, says Bebak. "Even with our hot summers, it's still cool under there. The old canopies were hot underneath, and they didn't last long in the summer sun."

Willis A. Smith introduced metal roof systems at the Mote complex in November 1991,

The open gap between the aquarium roof and taller shark tank canopy (photo at left) allows ventilation. The canopy's support columns (above) were engineered for extra strength and stability.

The first building with a metal standing seam roof system was the science education center, built in 1991 (left). The old roof in the foreground is made of concrete.

More About Mote

Founded in 1955 by Dr. Eugenie Clark with support from the Vanderbilt family, Mote Marine Laboratory and Aquarium is an independent, nonprofit organization dedicated to the pursuit of excellence in marine and environmental sciences, research and education. It is the world's largest center for basic and applied studies of sharks.

Originally known as the Cape Haze Marine Laboratory, it changed its name in 1967 in honor of William R. Mote, a major benefactor. The organization has an annual operating budget of $12 million, and a research budget of $7 million.

Mote Marine moved to its present location on City Island in Sarasota, Florida, in 1978. Its facilities now include seven buildings on the 10.5-acre City Island campus, and a field station on Summerland Key in the Florida Keys. Mote also maintains a fleet of vessels to support its research.

Mote Marine is operated by a staff of around 150 people, many with doctoral degrees, and 1,500 volunteers. As many as 400,000 people visit the main facility each year.

Its six major areas of study are:

- Shark research—shark biology and biomedical research
- Fisheries enhancement—fish biology, ecology and aquaculture
- Marine mammal and sea turtle research—dolphin, manatee and whale biology and health; sea turtle biology and conservation
- Eco-toxicology—the study of red tides, natural and man-made toxins
- Coastal ecology—biology and ecology of estuaries
- Tropical ecology —coral biology; Keys habitats

Mote has strong outreach programs, and its educational division includes on- and off-campus programs. In 1999, interns from 27 universities in North America and Europe received "real world" field and laboratory experience at Mote. The organization also uses land- and satellite-based video conferencing to reach students around the world.

This is the first canopy built at the Mote facility. It shades and protects a "tank farm" for baby sharks.

when they completed a new two-story science education center. The building is surrounded on three sides by existing laboratory buildings and covered with an MR-24 roof system.

A month later, the contractor erected Mote's first pre-engineered canopy structure—a Delta Joist™ structural framing system used to support a cloth cover for one of the complex's tank farms. Shading the tanks, which hold baby sharks, helped prevent algae growth, but the cloth cover proved unsatisfactory. Willis A. Smith replaced it with an MR-24 roof system in 1998.

Willis A. Smith has fit all of its construction projects around Mote's many activities. "We're open to the public 365 days a year," says Bebak. "It hasn't always been easy for Willis A. Smith, especially with the number of renovation projects we've done, to come in and work strange hours and weekends, but they've always been sensitive to our needs."

Mote Marine Laboratory is a non-profit organization, and Bebak also appreciates the way Willis A. Smith has been able to value-engineer aspects of the construction to help bring down costs. "They have been very cautious in the building process—identifying where we can save some

"I don't think there's really any better roof system out there for this sort of application"

DAN BEBAK

Dan Bebak (left), has jurisdiction over many of the buildings built or retrofitted with the new roof systems.

MOTE MARINE LABORATORY & AQUARIUM

Butler Builder®: Willis A. Smith Construction, Inc., Sarasota, Florida
Architect: Arthur F. Mead, N.C.A.R.B.
Size: approximately 25,000 square feet of roof systems on five buildings and 24,600 square feet of canopy systems
Butler® Systems:
Widespan™ structural framing system (science education building and most canopy systems)
Multi-Story structural framing system (administration building)
Delta Joist™ structural framing system (tank farm)
Butlerib® II wall system (science education building and canopy systems)
MR-24® standing seam roof system (all buildings except administration building)
CMR-24® standing seam roof system (administration building)
Naturalite™ skylight system (shark tank canopy)

money by doing something other than exactly the way it was drawn," he says.

The low-maintenance metal roof systems have cut overhead costs as well. "I don't think there's really any better kind of roof system out there for this sort of application," Bebak says.

"We're looking at covering some more of our existing aquariums with Butler® roof systems in the future—including the rehab tanks at our mammal center." ■

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