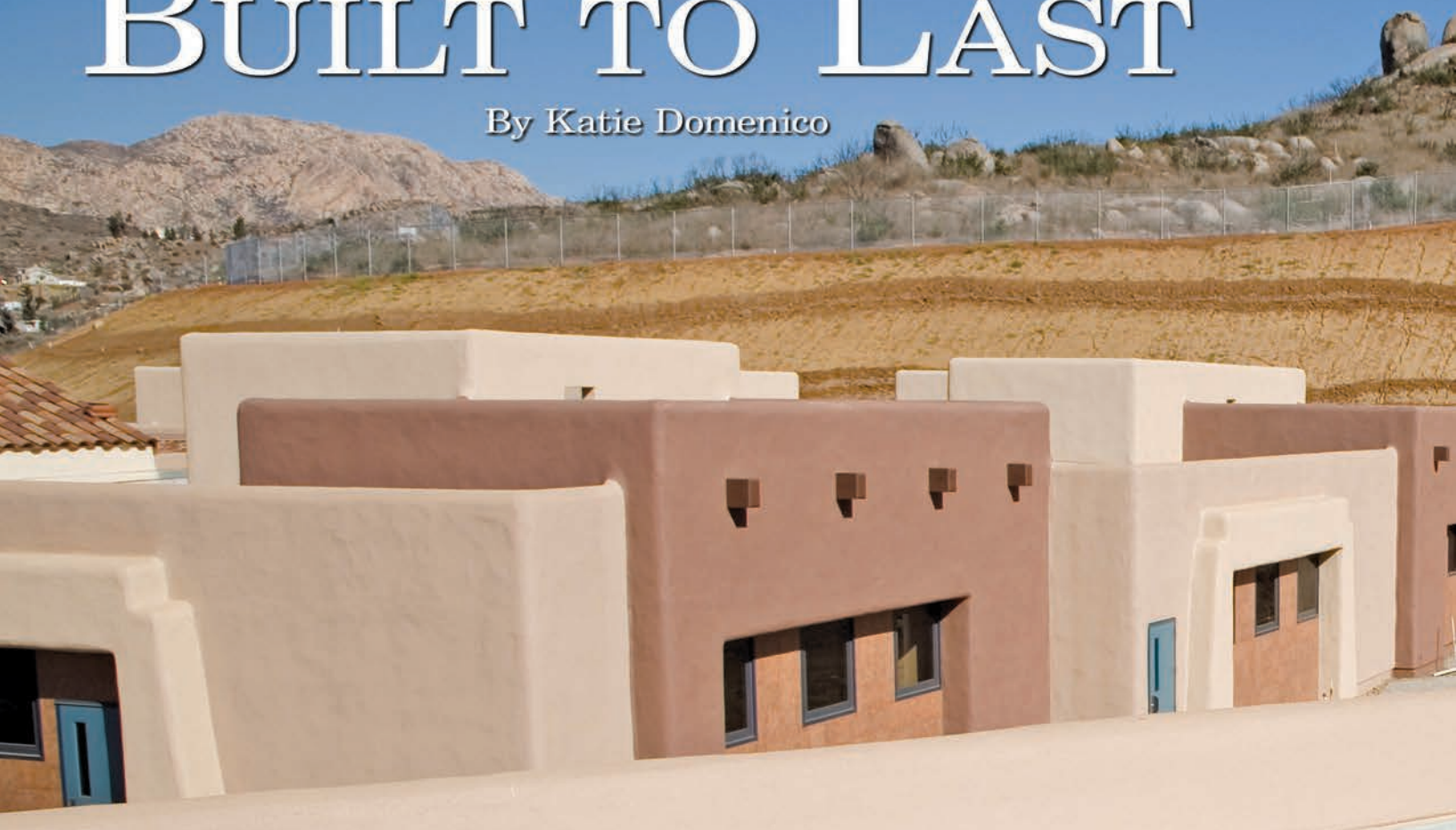


BUR IS BUILT TO LAST

By Katie Domenico



While roofing technology has come a long way in the past 150 years, manufacturers have yet to develop the perfect roof for every building. That's where the roof consultant comes in.

It is often his or her task to specify the ideal roof for the property owner in question. If the customer is looking for proven, long-term performance and peace of mind, many roofing professionals continue to rely on built-up roofing (BUR).

The advantages of a built-up roof—including long life, a variety of maintenance options, and outstanding puncture resistance—are well known to roof consultants. However, the true benefit of a roof's durability means property owners will have one less thing to worry about. They can spend their time productively running

their businesses or operations instead of repairing leaking roofs.

Roof consultants are also intimately familiar with the impact of a roof leak: a disruption in business or building operations, lost productivity, slips and falls, and other liabilities.

"If asked the question, 'Which roof system will last the longest without any leaks?' our answer would be a built-up roof," says Bill Borgiel, president of Lutz Roofing, Shelby Township, Michigan. "A built-up roof is the least likely to leak over a 20-year-plus life cycle, which is why we often use them on industrial plants, hospitals, and public buildings such as schools."

Recommending that clients install a roof system that gives them the best chance of eliminating unproductive distractions is a good business decision for roof consultants. A more durable roof

will enable property owners to focus on making profits instead of dealing with the aftermath of a roof leak.

Simply put, a built-up roof can offer clients peace of mind that their operations have the best protection possible.

"I have no problem with endorsing built-up roofing," says Luther Mock, RRC, FRCI, and founder of Foursquare Solutions Inc., Monroeville, Indiana. "The redundancy created by multiple plies of roofing felt is really what sets BUR apart."

One can argue that BUR's closest cousin—modified bitumen—is actually a built-up roof made on a manufacturing line. The reality is that the plies of a built-up roof create a redundancy that can exceed any potential oversights in rooftop workmanship.

"I'm just now replacing BUR for clients I worked with 30 years ago," says Mock. "We recently replaced [a BUR] specified in



Photo 1 - The Los Coches Creek Middle School in El Cajon, CA, opted for a BUR/modified-bitumen hybrid system with reflective white coating. (Photos courtesy of Johns Manville, Denver, CO.)



Photo 2 – This built-up roof is both attractive and reflective.

the early 1980s. And the only reason was because some of the tectum deck panels had fallen out of the assembly. Meanwhile, the roof was still performing well after 30 years.”

According to the Quality Commercial Asphalt Roofing Council of the Asphalt Roofing Manufacturers Association (ARMA), one of the main drivers of the demand for BUR systems is the desire of building owners for long roof-system life cycles.

“A solid core of building owners and roofing professionals continues to advocate hot-applied asphalt systems because of their long lives,” says Reed Hitchcock, executive director of ARMA.

Over the years, BUR has earned a reputation for reliability with building owners, roofing consultants, architects, engineers, and commercial roofing contractors. The original cost of a BUR system may be greater than other low-slope roofing options; but when taking the long view, BUR often comes out a winner. BUR enjoys a track record that is more than 150 years old, provides a thick, durable roof covering, and can be used in a broad range of building waterproofing applications.

BUR FLIES HIGH IN TEXAS

TPO and PVC single-ply roofing technologies have been significantly enhanced in recent years. However, some clients simply cannot risk a puncture and potential leak in a one-layer roofing system.

One of these property owners is Lockheed Martin Aeronautics Company. It is currently having a 2.1-million-sq.-ft., hot-applied, four-ply BUR system installed on its headquarters facility in Fort Worth, TX. Officially designated as Air Force Plant 4, manufacturing activities include final assembly for U.S. Air Force F-35 Lightning

II and F-16 Fighting Falcon jet aircraft.

“On average, Lockheed may have upwards of \$200 million worth of aircraft on the assembly line below that metal deck,” says Scott Tankersley, president of Anchor Roofing Systems Ltd. “You can bet it will do whatever it takes to best protect those kinds of assets.”

Before installing the new BUR system for Lockheed, Anchor Roofing maintained the existing four-ply system originally installed in the 1970s.

“We’re real believers in built-up, and so is Lockheed Martin,” says Tankersley. “The number one reason for us is hail resistance. On high-value buildings, a single-layer system is simply not the right choice.”

The primary benefits of BUR include:

- Proven track record of performance
- Broad range of application methods
- Available as part of a fire-, wind-, and/or hail-rated roofing system
- Wide choice of top surfacing, including “cool roofing” options
- With insulation, provides an even better-performing building compo-

nent

- Superior waterproofing characteristics
- High tensile strength
- Competitive life-cycle cost
- Long-term warranties (available with many BUR systems)

Components in the BUR system consist of a roof deck, vapor retarder, insulation, membrane, flashings, and surfacing material. The roofing membrane is made up of two components—bitumen and felts. Bitumen is the waterproofing agent and adhesive for the system. The felts strengthen and stabilize the bitumen.

The roofing membrane is protected from the elements by a surfacing layer—either a cap sheet, gravel-embedded in bitumen, or a coating material. The most common surface for a BUR system (particularly in the Western U.S.) is a fiberglass, mineral-surfaced cap sheet. It offers a number of advantages. It has a white granular surface, is cost-effective, produces less weight on the structural deck, and is relatively maintenance-free. Surfacing can also enhance the roofing system’s fire performance rating.

Another surfacing option is gravel, commonly used in most areas of the country where availability and the additional weight on the roof system would not be a problem. There are also a number of smooth-surface coating options. The most popular of these are aluminum or clay emulsion products that offer greater reflectivity than a smooth, black, non-gravel-surfaced roof.

“Built-up roofs are the toughest of the roofing systems we install,” says Rich Boone of Boone Brothers Roofing in Olathe (Kansas City), Kansas. “Where pedestrian traffic is high, a BUR system has no equal.”



Photo 3 – The reflective roof on St. Patrick’s School, St. Charles, IL, was installed by Crowther Roofing & Sheet Metal, Romeoville, IL.

COLD-PROCESS BUR

Cold application of BUR has provided an alternative to traditional hot-applied systems for more than 30 years. The term “cold-applied” means that the BUR system is assembled using multiple plies of reinforcement adhered with a liquid adhesive instead of hot asphalt. These cold adhesives are applied between reinforced base/ply sheets to provide a weatherproof membrane.

In cold-process BUR systems, manufacturers typically require that only fully coated, nonporous felts (such as standard base sheets) are used as base and ply sheets. Generally, an aggregate surfacing or a coating is then applied over the completed membrane to provide protection and a fire rating for the roof system.

“In the reroofing market, we’re definitely seeing more cold-applied systems being specified, particularly with modified bitumen,” says Mock. “It’s a natural alternative when a building may be occupied during the reroofing process.”

“We’ve been very happy with the newer generation of cold-process, asphalt-based roofing,” agrees Tankersley. “With a highly reflective cap sheet, these systems can earn Leadership in Energy and Environmental Design (LEED®) points for energy efficiency, and there are no odors whatsoever.”

Adhesives can be applied either manually with a squeegee or brush, or via spray application equipment. When numerous roof penetrations or rooftop access become issues, Anchor Roofing prefers a manual application.

Proper coverage rates are vital to a successful, long-term, cold-applied roof system. Both spray and manual application methods require that the proper amount of adhesive material be installed. If too little adhesive is applied, there is a potential for an improper bond to be formed. If too much is used, then the potential for longer set-up times and membrane displacement is increased.

“Cold-applied BUR application techniques and the use of low-rise foam for insulation attachment have worked out well for us,” says Tankersley. “However, these cold-process systems definitely feature a



Photo 4 – The owner of this shopping mall chose BUR primarily due to its redundancy. Multiple plies of roofing can provide extra insurance against water intrusion.

steeper learning curve for the average roofing contractor.”

Anchor Roofing installs a minimum of one million square feet of asphalt-based, low-slope roofing every year.

“I’m comfortable specifying BUR, because I’m confident that I will have a seasoned contractor on the job,” says Mock. “The commitment in terms of skilled labor and equipment is simply too great for these contractors to be first-timers.”

Flashings are another critical component of every roofing system. Today’s four-ply BUR systems use modified-bitumen flashings almost exclusively. These membranes are predominately SBS-modified and offer greater elongation where it counts most—at the interface of the roof system with other building components.

Use of a modified-bitumen base ply is one way of handling general flashing requirements, although modified cap sheets are more common.

Roofing manufacturers have also developed liquid-applied flashing systems that offer a number of benefits. First, they are typically included in manufacturers’ guarantees. For property owners, this means fewer guarantee exclusions and less maintenance, with an increased return on investment due to lower life-cycle costs. Liquid-applied flashings also offer aesthetic benefits by matching the finish of surrounding roof areas.

Liquid-applied flashings are especially welcome when roof consultants are faced with irregular roof penetrations. One roof system manufacturer uses a flexible, strong, and puncture-resistant polyester scrim as the reinforcement for its flashing system.

The scrim is sandwiched between layers of solvent-free, elastomeric, cold-applied adhesive. The two-component product consists of an asphalt base material that is chemically cured with an “activator.” Reinforced with the polyester scrim, the resulting system forms a durable elastomeric seal that bonds strongly with a variety of substrates and features low permeability.

BUR REPAIR AND MAINTENANCE

To some extent, the life expectancy of a BUR system depends on the commitment to routine maintenance on the part of the property owner. Any roof system can benefit from an owner’s commitment to a proactive management plan. BUR installed over an insulation package lends itself well to non-destructive testing (infrared) as a means to maximize service life.

“Asphalt roofing systems have the potential for a very long life, and preventive maintenance is the key to realizing that potential,” says ARMA’s Hitchcock.

The goal is for problem areas to be detected and fixed before they develop into leaks. Inspections can reveal potentially troublesome situations, such as a loss of gravel surfacing, which could lead to felt erosion or brittleness. Less commonly, punctures and cuts to the membrane can occur, so it is wise to remove sharp objects and debris from the roof. Clogged drains or poorly sealed flashings also present problems that are repaired easily. The effects of chemical exhausts on roofing materials should also be monitored.

These and other preventive maintenance actions can help catch problems before they damage larger areas of the roof system.



Photo 5 – Nongravel BUR surfacing options include aggregate, mineral surface cap sheet, or a smooth, surface-coated membrane. After many years of exposure to the elements, all of these surfacing materials may need some attention due to possible aging and weathering of the BUR surface.

Inspections should be performed not only on aging roofs but also on new roofs to guard against errors in installation, design, or specifications.

BUR has proven to be a low-maintenance roofing system and can also be effectively repaired when needed. This means property owners can usually get more life out of a BUR. The ability to enhance the performance of existing BUR membranes with coatings, modified-bitumen cap sheets, flood coats of asphalt, or reembedding of aggregate help explain the long service lives of these systems when properly cared for. These BUR maintenance and repair solutions are typically more involved than peel-and-stick patching on some single-ply systems. However, like BUR, these repair options have been proven to work well over time.

Nongravel BUR surfacing options include aggregate; mineral-surface cap sheet; or a smooth, surface-coated membrane. After many years of exposure to the elements, all of these surfacing materials may need some attention due to possible aging and weathering of the BUR surface.

The loss of protective surfacing or coating from weathering may give the BUR a cracked appearance that roofing professionals refer to as “alligatoring.” Moderate alligatoring can be treated by cleaning the surface of the roof, applying a primer, and resurfacing with an asphalt emulsion.

Bare spots resulting from wind scour or water erosion require the removal of dirt and loose aggregate. These areas can then be primed and recoated before new aggregate is reembedded into the surface.

Splits or tears in aging BUR systems can also be readily treated. Any poorly attached elements of the BUR can be resecured with fasteners into the deck. The fasteners and splits can then be stripped in with a modified bitumen membrane.

Ridging on aging BUR membranes can form due to internal moisture collecting at the insulation joints or because of insulation movement or curling. When the tops of these ridges lose their surfacing, they can be cleaned and recoated with a roof coating or mastic and aggregate to prevent further roof deterioration.

“Crazing, punctures, building movement, damage to base flashings, and anything that turns vertical on a BUR is going to be exposed to weathering,” says Tankersley. “But all of these issues can be addressed through proper maintenance.”

Before the advent of modified-bitumen flashings, metal-edge gravel stops and edging for BUR generally consisted of a double layer of felt stripped in after the finish coat of bitumen and surfacing or cap sheet were applied. After years of thermal or wind-induced stresses, splits can form at the joint

between the metal edging and the stripping felts. Today, these areas can be repaired with modified-bitumen flashing material to add strength and flexibility to the edge metal detail.

“We’ve replaced gravel, base flashings, sheet metal, and expansion joints and made lap repairs without our customers having to suffer through a tear-off,” says Tankersley. “For industrial customers with sensitive manufacturing equipment, this is a huge benefit.”

Missing or badly deteriorated metal cap flashings can also be replaced. Loose metal sections can be refastened and then resealed at the reglet or top of the counter flashing with a construction-grade sealant. In general, this is only an option for reglet- or surface-mounted flashings. All too often, using this sealant repair option on through-wall flashings makes a bad problem worse.

Expansion joint problems are generally associated with failures at the joint connection and deterioration of rubber bellows due to weathering. Deteriorated bellows should be replaced, while loose metal cap expansion joints can be resecured, along with the use of an elastomeric sealant at joints for added flexibility.

On older BUR designs using pitch pockets, the fill material had a tendency to shrink over time. In this case, an elastomeric sealant (not bitumen or roof cement) can restore pitch pocket seals and slope.

“Property owners rarely have to replace a four-ply BUR until it is absolutely, positively worn out,” says Tankersley. “Based on experience, these asphalt-based systems ‘hang in there’ longer than less robust roof options.”

So, why is BUR still a good choice in today’s low-slope roofing market? The simple answer is because the system is built to last. Its track record of performance is difficult to surpass, and BUR often continues working long after its warranty has expired.



Katie Domenico

Katie Domenico is product manager for BUR and APP at Johns Manville’s Roofing Systems Group, Denver, CO. She joined the company in 2008 and is an active participant in ARMA committee activities.

