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EPDM Evolution in the Repair and Restoration of Aged EPDM Roof Systems

April 21, 2008

Good roofing practice has always been to tear off an existing roof to the deck and replace it with new material, but that is beginning to change. The age has come where tearing off an older roof may not be the best choice on behalf of the building owner or the environment.

Sustainability, the latest buzzword in the commercial roofing industry, is fuelling the desire of building owners to minimize resource consumption and also reduce landfill usage. The advent of several forensic diagnostic tools available to roof consultants is consistent with the trend of minimizing waste and extending the life of existing materials. More than ever, consultants can provide their customers with multiple options when their roof systems are in need of repair.

Consultants are increasingly turning to technologies such as infrared and nuclear moisture scans, moisture meters, fastener pull-out equipment, insulation density tests and GPS tools to

help them determine the best option for an aged roof. When these tools are used in conjunction with thorough energy analyses and life cycle costing, the best solution becomes clear. With these technologies, consultants have the upper hand in providing their clients with the most logical and economical roofing solutions for their aging roof systems.

All of these testing methods and technologies could not have come at a better time. Over the past 45 years, EPDM single-ply roof systems have grown considerably in market share compared to their modified bitumen and built-up competition. As a result, there are many aging EPDM roofs, and consultants will be faced with the task of providing cost-effective, durable solutions to keep them in proper working order without tearing off the existing roofs.

Several factors come into play and impact a consultant's decision regarding a roof system at the end of its useful life. Thermal bridging, proper drainage, R-value, surface colour,

wind uplift, and hail resistance are all important factors to consider. When everything is taken into account, consultants are faced with two primary choices when addressing an aged EPDM roof besides a complete tear off and replacement – restoration and recover.

1) EPDM roof restoration usually encompasses reworking the flashings, seams, and terminations, while leaving the field membrane in place. EPDM is well known for its long-term weatherability, so in most cases, the field membrane has life left. This option is used primarily when the owner wants to extend the life of the existing roof or warranty coverage for an additional five to 10 years.

2) EPDM roof recovers provide the ability to address more issues than a typical restoration. Proper drainage, thermal bridging, enhanced R-value, altered surface colour, as well as enhanced wind uplift and hail resistance are all issues that are better addressed with a roof recover.

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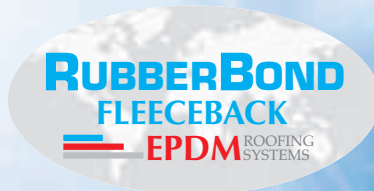
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In order to meet building owner needs, professional roof consultants are becoming fully educated on energy spending, environmental issues, and restoration choices. Each facility should be analyzed for a myriad of material choices, and need to be looked at with regard to structure type and use. Geographic location of the building relative to cooling degree days and heating degree days, surrounding buildings, wind, fire, the existing maintenance program, maintenance costs available for washing the roof, and insurance are just a few of the basic considerations that must be looked at when determining how to address an aging roof.

The remainder of this article is focused on accepted practices when considering an EPDM roof restoration or recover. Both options require a thorough investigation and all wet insulation removed and replaced.

EPDM Restoration

Because of today's technology and environmental concerns, consultants may justifiably choose to restore an existing roof without the need for replacement or full recover. Restoring single-ply systems can be the most

prudent thing to do for a building owner. The life cycle should not be counted until the usable life of the roof is really over, and many single-ply systems are providing serviceable life well beyond 20 years of age.

When considering restoration options, the type of membrane must be taken into account. If a building owner originally selected an economical membrane such as a 45-mil sheet, then the restoration process may require a roof coating to extend the life of the sheet in addition to stripping in the seams and redoing the flashings.

Over the past several years, coating technology has advanced significantly. Today's coatings are considered a viable solution to an aged, but not failing, system. Many roof coatings feature warranties that cover the products' reflectivity and performance, providing buildings and their owners with years of protection and extended service life.

For buildings that feature a thicker, more premium membrane such as a 60-, 75- or 90-mil sheet, restoration procedures may only have to address the seams and flashings.

Coatings can still be used to enhance reflectivity, but in many instances, they are not necessary to enhance the field membrane's performance. The old adage of "pay me now or pay me later" holds true when it comes to the thickness of some roofing materials, and it is encouraging that building owners are increasingly recognizing the benefits of thicker membranes. When redoing seams and flashings, nothing is more important than proper membrane preparation, regardless of its thickness. The accepted method of membrane prep for the area to be stripped in is to scrub it using warm water and a low sudsing soap such as Spic and Span, Tide® or Lestoil®. After the membrane has been washed, it must be rinsed with clean water and given time to dry. Next, a weathered membrane cleaner and primer coat of splicing cement must be applied prior to installing a cured, EPDM cover strip that will ultimately waterproof the seam.

For fully adhered systems with large areas of delamination, the primary restoration procedure involves adhering a reinforced universal securement strip (RUSS) to the existing membrane and then mechanically fastening

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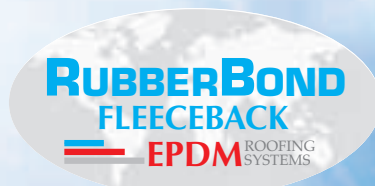
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it at 12 inches on centre. RUSS is available in standard and self-adhering options. It is utilized in perimeter securement on mechanically fastened, fully adhered, ballasted, and metal retrofit systems and can also be installed horizontally and vertically with seam-fastening plates below the EPDM deck membrane for additional securement or in conjunction with gravel stops and edging details. Many contractors favour this option over installing narrow-width perimeter sheets to meet wind-uplift requirements.

After installing the fasteners and plates, the upgraded attachment is stripped in with cured cover strip. For areas with a small amount of delamination, fasteners can be installed directly through the existing sheet and then stripped in with cured cover strip. For mechanically fastened systems, any loose or tented fasteners should be replaced or re-secured prior to completing the strip-in process outlined above.

The restoration procedure for ballasted systems is similar to the fully adhered and mechanically attached method; however, the stone must first be removed from the areas in need of repair. It should be noted that rakes or

shovels should not be used, as they can damage the field membrane. A gravel pusher or push broom should be used to clear approximately 12 inches of area on each side of the splice. After the splice has been exposed, the same strip-in procedures outlined above can be followed.

For large restoration or full recover projects, many contractors utilize a vacuum method to efficiently remove ballast from the roofing system. This method utilizes a Hydro-Vac (industrial vacuum) that sucks the ballast from the roof and into a truck or tank on the ground. After large roof areas are recovered or replaced, the ballast can be reloaded back onto the roof by reversing the vacuum, pumping the ballast back to the rooftop. This method creates less dust and debris within the building and the surrounding environment, while allowing the ballast to be easily reused.

EPDM Roof Recover

This option is primarily employed on adhered and mechanically fastened systems and is an exciting development in the roof-repair industry, as it provides the opportunity to address more building issues than a typical restoration. Through today's

innovative energy-analysis software, it has been noted that most buildings in the United States are under insulated. This is important, since the cost of energy has gone up dramatically in the past 10 to 15 years.

Recover options afford the opportunity to add more insulation to the rooftop without having to tear off the original material. The insulation can be fastened in place, or in some cases, adhered directly to the existing material with a two-component urethane adhesive. With the recent advancements in insulation product offerings, drainage issues can also be addressed with tapered insulation or crickets prior to the installation of the new membrane.

Altering the color of a building's rooftop is also easier in a recover than a restoration. If a building has a black roof in the south, where there are more cooling degree-days than heating degree-days, it makes sense to consider recovering the system with a white membrane. Conversely, if one has a white roof in the north, where there are more heating degree-days than cooling degree-days, a black roof recover could be the answer. The emergence of fleece-backed

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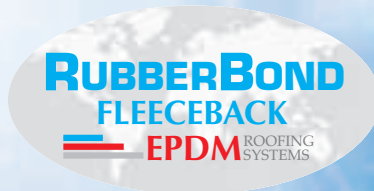
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technology (a single-ply membrane matted to a fleece material) has advanced the roof recover industry. These membranes are excellent choices for a roof recover, as the fleece acts as a separator between the new membrane and the old membrane, while providing an increase in puncture- and hail-damage resistance.

This method has been popular for several years, when recovering asphalt-based roofing systems and the technology has recently been extended to single-ply systems as well. In many cases, the existing EPDM membrane can be power washed, and then a fleece-backed membrane can be adhered directly to the old roof. One can think of this as a two-ply system that provides dual protection, yet it is still much lighter in weight than many of the alternative multi-ply roofing systems.

Another option gaining in popularity is a roof garden recovery. This allows a new membrane to be loose-laid on top of the existing system and then covered with a traditional or modular garden system. Roof gardens not only provide an aesthetically appealing roofing option, but also help reduce a building's storm water runoff and lower its overall energy cost.

Roof gardens can add significant weight to the structure and a structural analysis should be performed before they are implemented.

As the market for single-ply has grown over the years, there is an expanding body of knowledge, techniques, and design options available to building owners who are looking to protect their assets, maximize their return on investment, and be in sync with the sustainability movement. Restoring or recovering an existing roof system makes sense because the owner and the environment receive numerous benefits. In addition to the obvious advantage of a watertight roof, other benefits of a recovery or restoration include extended service life, less waste generation, less ozone depletion, little disturbance to building operations, and the financial advantage of incurring minimal maintenance costs versus large-scale capital expenses for full replacement.

Investigative tools have dramatically improved over the past decade and investigation techniques are beginning to follow suit. In the future, system and material choices will be based on how the roof space will be used. As consultants continue to become familiar with the latest

technologies, the process of tearing off an existing roof may become less and less appealing.

Author Bio: Ron Goodman started with Carlisle SynTec Incorporated in 1982 and has 25 years experience in the commercial roofing industry. He earned a bachelor degree at The Pennsylvania State University and a master's degree in business from Shippensburg University. Ron has been involved in product development for over 20 years and currently serves as a product manager for Carlisle.

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