



# INNOVATING A NEW FUTURE WITH SINGLE-PLY ROOFING

By Janial Mack, RRO, CDT

**I**nnovation enables an industry to change and adapt to external environments and thereby enhance its performance. Innovation is driven in the roofing industry, in part, because of healthy competition and strong demand at all levels. This article explores innovation as a response to changing influences that impact the roofing industry.

The single-ply roofing industry has exploded over the past ten years. Its market share reached an estimated 85% of the low-slope commercial roofing market in the United States through 2017 (Figure 1.) Sustainable growth is expected in the foreseeable future.

Manufacturing plants for roofing products and raw materials that go into roofing assemblies continue to be built around the world. Innovation in materials, assemblies, and fastening methods has grown over the years because of regulations, better technology, labor shortages, and good old-fashioned ingenuity.

## A DECADE OF PRODUCT INNOVATIONS

Innovative materials supplied to the roofing industry encompass a prolifera-

tion of adhesives—including those containing low-volatile organic compound (VOC), no-VOC, and water-based adhesives—primarily due to regulations. Even though adhesive application methods remain largely unchanged, the coverage rates, flash-off, and cure times vary greatly, based on the weather and chemical makeup of the adhesive. These variables have many contractors looking to reduce the use of adhered systems because of the variety of application pitfalls and training challenges associated with regulated adhesives.

Notable roofing material innovations from the past decade include improved facer options on polyisocyanurate insulation, the

introduction of higher-grade ketone ethylene ester (KEE) polymer, membrane dirt-protection films, external reinforcement, scrim reinforcements, weathering packages, insulation-blowing agents, sound-deadening insulation, high-density cover boards, pre-applied seam tapes, vented assemblies (Figure 2), and induction-

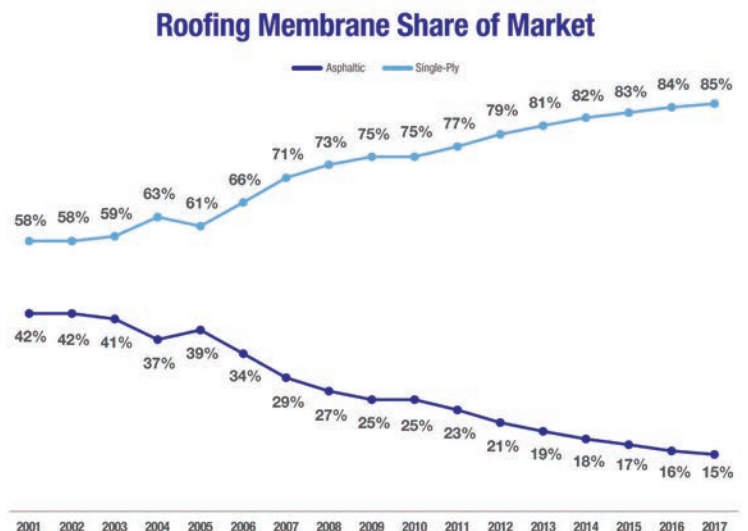


Figure 1 – Roofing membrane share of market. Source: various industry association data, including SPRI.

- 1 Pressure Relief Vent
- 2 Membrane
- 3 Polyiso Membrane
- 4 Channeled EPS Insulation
- 5 Wet Structural Concrete Deck

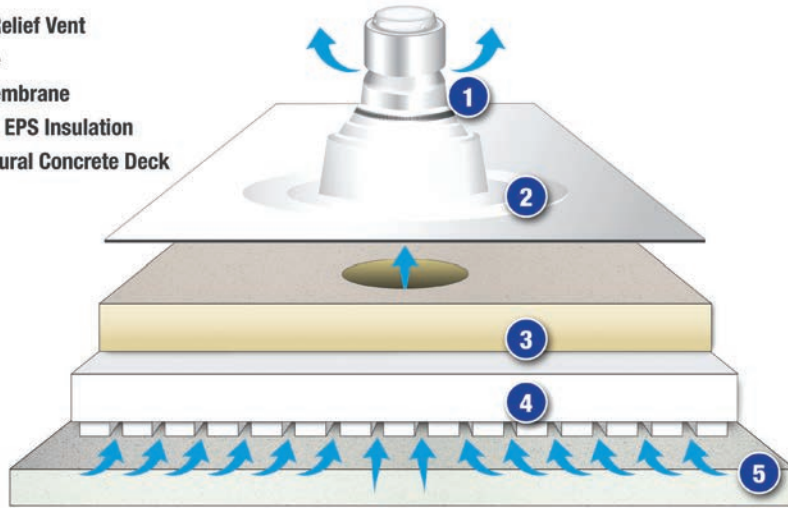


Figure 2 – Vented assembly with channeled EPS insulation.

welded fastening systems.

Prevalent attachment methods changed from historically effective loose-laid ballasted systems with a good life-cycle track record. As a result of concerns about flying debris during hurricanes and the difficulty of finding leaks, ballasted assemblies have experienced a reduced rate of new applications than was seen in previous decades. Ballasted systems outside of hur-

ricane-prone zones remain a highly reliable assembly solution and provide ultraviolet (UV) reflectivity while keeping the membrane protected. In new construction, a heavier ballasted roof (minimum 10 pounds per square foot) can be integrated into design as part of the building diaphragm, allowing for changes in the steel structure and lower building costs.

Recyclability of existing assembly mate-

rials is a growing challenge to the roofing industry. Reroofing existing ballasted installations offers the greatest potential to divert tear-off materials from going into the landfill. The .045 ethylene propylene diene monomer (EPDM), polyvinyl chloride (PVC), or thermoplastic polyolefin (TPO) membrane and insulation can be recycled, and the ballast can be reused. When the existing insulation is in good condition, it can remain in place, and new insulation can be added on top to meet current energy codes. New, thicker membrane, such as 60- or 90-mil EPDM membrane, can be added, and the ballast replaced by hand or by reversing the vacuum system and blowing the ballast back onto the roof area.

Roofing materials depend on other building components as an integral part of the assembly. When other trade industries change materials, unintended consequences can affect the roofing industry. Ballasted assemblies also offer an excellent solution for the issue of moisture in newly poured lightweight structural concrete decks. Since this assembly is loose-laid, there is no dependence on adhesives or fasteners that can interact with the concrete deck and

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cause premature deterioration or failure of components. Ballast also protects the roofing assembly from hail damage, keeps the membrane cooler during hot weather, and acts as a warm blanket during cold nights. These features make ballasted roofs suitable for virtually all climates (aside from hurricane zones)—even hot desert areas where temperatures drop precipitously overnight.

### EVOLVING EXPECTATIONS

People's expectations of the roof platform have also changed over the past decade. Historically, the purpose of the roof was to keep the weather from entering the building. Today, roofs are used as platforms for energy generation devices, urban farms, amenity spaces, and are expected to withstand volatile weather patterns such as increased hail, wind, and extreme weather conditions. This transformation has also spurred the development of leak-finding equipment and technology applications to assist in the detection of breaches in the membrane.

With the challenges facing the construction industry—particularly roofing—one must ask what the next decade will require of consultants, contractors, and manufacturers.

### WHAT'S IN STORE FOR THE NEXT DECADE OF SINGLE-PLY ROOFING?

Unfortunately (or perhaps fortunately), labor shortages will drive innovation at all levels of the single-ply roofing industry. Contractors will have to focus on ways to install roofs with fewer employees, within tight deadlines, while still providing high-quality installations they can be proud to stand behind. Manufacturers will develop labor-saving products and attachment methods that meet regulations, and consultants will provide resilient assembly designs that can recover after a weather event and offer all the protections building owners need.

The industry has worked hard to make products more user-friendly and easier to understand to simplify the application processes and help avoid mistakes in the field. Labor-saving products continue to be a focus as the industry suffers from a skilled roofing labor shortage. This focus will drive innovation in ways we have yet to see.

As we move toward a future of increased regulations, shortages of skilled labor, demand for space (leading to the use of

the roof as a platform for energy generation or food growth), and the desire for instantaneous information, the possibilities are endless.

### REGULATIONS DRIVING INNOVATION

The regulation goals are very clear regarding reduction or elimination of VOCs. This posed a challenge to roofing manufacturers and has helped to drive innovation. Focused solutions have been developed that can be installed without the use of liquid adhesives, such as pre-applied adhesives

and tapes added to full sheets of membrane, then applied in a peel-and-stick fashion. Innovative methods of adhered assemblies, such as the hook-and-loop attachment method, in conjunction with Fleeceback membranes, eliminate the use of adhesives and are unencumbered by temperature limitations (Figure 3).

The drive for energy savings has led to innovations in insulation, such as sandwich insulation boards, composite boards utilizing ½-in. high-density polyisocyanurate in conjunction with expanded polystyrene

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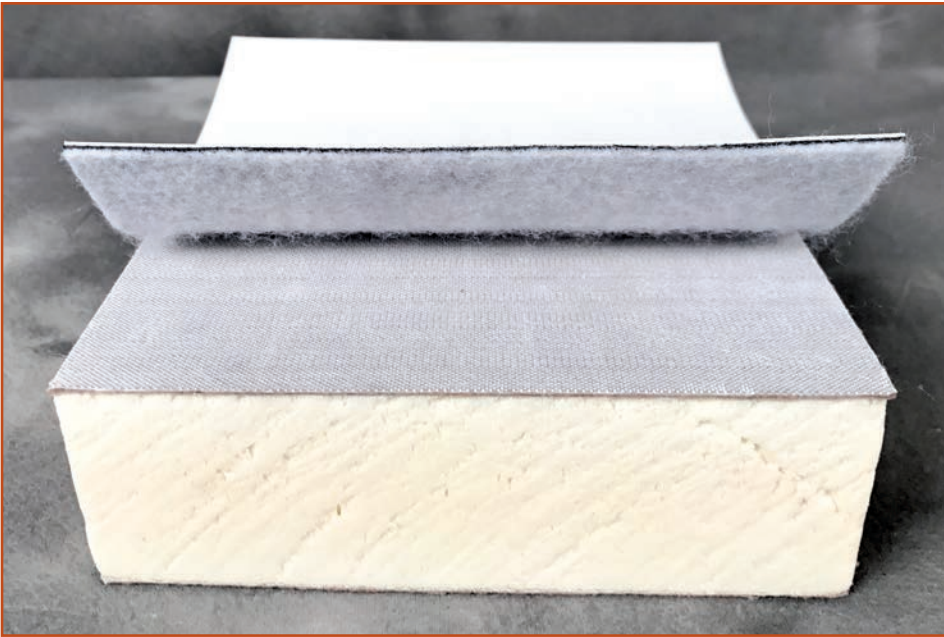


Figure 3 – Hook-and-loop attachment system powered by Velcro® Brand Securable Solutions.

(EPS), or standard-density polyisocyanurate insulation board stock.

### LABOR SHORTAGES DRIVING INNOVATION

Innovation is not—and should not—always be in the form of materials. Sometimes innovation needs to be in thinking, education, and training methodologies and practices. All areas of the roofing industry have new focus and training tools. Technology has allowed training to become a solution that can be viewed on an as-needed basis, with videos showing means and methods of installing different materials. Roofing contractors struggle to find skilled labor, so they must teach and train to the necessary skill levels. The tipping point that changes the cost-benefit analysis of training has arrived; the cost of poorly skilled workers is getting too expensive.

The National Roofing Contractors Association's (NRCA's) focus on training is at an all-time high, with the intent to raise the perception, skill level, and overall professionalism of each and every contractor member. The NRCA's One Voice Initiative is innovation in training, communication, and opportunity for everyone in the roofing industry. By supporting and contributing to the NRCA's One Voice Initiative, we have the opportunity to raise skill levels and improve the reputation of the roofing industry around the world.

The exchange between manufacturers and roofing consultants is also at an all-time high for the single-ply roofing and building envelope construction industries. The collaboration and team approach to construction has proven to provide a better building to the owner, regardless of whether it is new construction or a renovation.

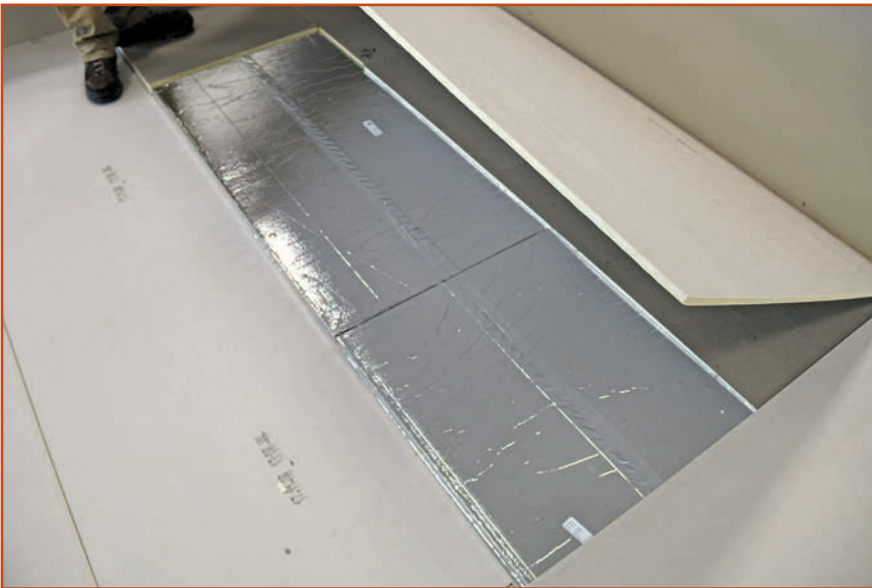


Figure 4 – Vacuum-sealed insulation on the deck, used in conjunction with polyisocyanurate.



Figure 5 – Thin film covering TPO membrane. Film is removed at the completion of the installation.

## TECHNOLOGY AND INGENUITY DRIVING INNOVATION

As we move into the future, technology and ingenuity will continue to be powerful resources in inventing, improving, and changing the future of roofing. Technology is driving innovation in all areas of roofing, including those roofs that serve purposes other than keeping the elements out of the building. Technology will influence innovation in a variety of focuses, such as:

- Leak detection materials, equipment, and methodologies. One day the building owner will be notified if there is water entering the building, and will be able to pinpoint where the water is coming in, while simultaneously dispatching a service provider.
- Recyclable pressurized adhesive dispensers
- Channeled insulation and vents for applications over concrete decks (Figure 2)
- Vacuum-sealed insulation (Figure 4)
- Dirt-protection films for use during construction (Figure 5)
- Direct-to-metal-deck air barriers that eliminate the need for a base board (Figure 6)
- Solar array attachment devices and methods
- New designs in vented roof technology (Figure 7)



Figure 6 – Air barrier being installed directly to a metal deck.

- On-demand training tools
- Safety rules and references at the job site by subcontractor specific to that project

All of the reasons single-ply became popular in the '80s and '90s are still valid today: the ability to cover large areas of roof deck in a short amount of time, flexibility of varying assembly weights, cleanliness of application, reparability of material, elongation properties, weathering ability, and quality control of product manufacturing. Single-ply continues to be the most lab-tested roofing material in the history of North America, adding to its reliability and predictable performance.

New materials and application methods will be

the future of the low-slope roofing industry. Embracing innovation will help us enhance the lives of people working in the industry. Single-ply roofing has contributed to that end by using less-hazardous materials than in previous centuries of roofing. When innovation can enhance the lives of the next generation, then a higher goal has been achieved. 🏠



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Janial Mack is the National Manager of Consulting Services for Carlisle Construction Materials. She holds a BS degree in business marketing from Shippensburg University. Her experience includes 34 years in the roofing industry, having held various positions, from technical sales engineer to regional and national sales and marketing management posts for Carlisle. Mack is a member of RCI, a Registered Roof Observer, and holds a Construction Document Technologist certification from CSI.



Figure 7 – Engineered vent used for vented roofing assemblies.