

# PREFABRICATION AND INDUCTION WELDING:



## Combatting Labor Shortages with Dual Roof Membrane Technologies

BY SCOTT BIEBER

Figure 1 – Typical thermoplastic roofing job site and crew.

**L**abor shortages have had a harsh impact on the roofing industry.

The recession of 2008-09 hit hard, forcing experienced roofers to leave the industry. As the economy has recovered and gained momentum, roofing contractors have been faced with the difficult task of restaffing their companies, often with less-qualified individuals. This lack of skilled labor has led to project delays, increased roofing costs, greater waste, installation quality issues, and higher liabilities for both contractors and building owners.

Finding ways to reverse this trend has driven education initiatives within the roofing industry, as well as collaboration between trade groups and vocational schools and colleges. While this bodes well for the future, what about the here and now? Roofing contractors, architects, and consultants have been forced to take a fresh look at the roofing membrane technologies

being specified and installed amid this labor crisis.

Two system approaches have risen to the top, providing positive solutions for the diminishing skilled labor pool: prefabrication and induction welding. Using these approaches together maximizes productivity and installation quality on the job site.

### PREFABRICATION

We can think of the single-ply roofing industry as a 45-year quest for greater control over roof installation. Contractors have always struggled with ever-changing weather, scheduling, temperature-sensitive materials, and labor—even under the best of conditions. The single-ply roofing industry responded by introducing prefabricated membranes. This allowed many roofing companies to reduce the crew size that they had grown accustomed to when installing traditional bituminous roofing materials (Figure 1).

Prefabricated roofing membrane panels further reduced the linear footage of field seams and the required seam labor by as much as 80%. Yet, these consistent factory-fabricated membranes solved only part of the problem. Without the redundancy of the built-up roof, the demand for skilled labor at the critical areas of the rooftop—penetrations, walls, drainage details, seams, and perimeters—has come into sharper focus.

High-quality detail work has emerged as one of the most important aspects of any roofing operation. For this reason, most single-ply roofing manufacturers offer at least a few prefabricated items. It is not uncommon, for example, to see pre-made corners and pipe flashings on single-ply job sites (Figure 2). This is true for both thermoplastic (PVC and TPO) and elastomeric roofing systems (EPDM).

Besides dramatically reducing the flashing installation time, it also moves the roofer from the difficult vertical transition



Figure 2 – Prefabricated pipe stack flashing.

Figure 3 – Custom prefabricated curb flashings.

out to the skirt on the horizontal field, where it's easier to make a seam. The skill needed to weld a membrane skirt to the roofing membrane is far less advanced than that required for assembling and seaming an entire curb or pipe flashing on site (Figure 3).

Some thermoplastic roof systems take prefabrication to another level. Custom-engineered flashings made from reinforced PVC membranes are made to fit rectangular rooftop units, skylights, and hatches in ¼-in. increments. They can easily be pulled over the top of a new curb or wrapped around the curbs of existing penetrations.

Prefabrication also proves valuable in the merging of metals and membrane at critical drainage points and perimeters.

Scuppers have always presented challenges for roof mechanics, particularly when they are trying to work the nozzle or brush into



a small scupper opening to get a watertight seal between the membrane and the metal. In response, prefabricated scuppers (Figure 4) provide a solid weld between membrane and clad metal. The custom sizing of these scuppers also dramatically speeds up the installation; again, the critical transitions have been done in the factory, and the unit is watertight before it ever arrives at the job site.

Prefabrication also provides additional solutions at drip edges and gutters. Membranes that are pre-welded to PVC-clad metal hook strips and flanges allow for a watertight seal at the most

weather-beaten part of the roof (Figures 5 and 6).

#### INDUCTION WELDING

In recent years, several thermoplastic membrane manufacturers have incorporated induction welding into their mechanically fastened roof systems (Figures 7 and 8). This technology allows the roof membrane to be welded to underlying plates that are clad with chemically compatible thermoplastic coatings.

In light of today's labor shortages, roofers using induction welding (Figure 9) as a method of thermoplastic membrane attachment have reported increased productivity while simultaneously delivering improved roof system performance.



Figure 4 – Custom prefabricated scupper combining metal and membrane.



Figure 5 – Prefabricated drip edge system.

With systems using the traditional in-seam mechanical attachment of roof membranes, there is a separate set of screws and plates for insulation and membrane attachment. Induction welding, on the other hand, makes use of the same fastener and plate for both, without penetrating the waterproofing surface. This can result in 30-40% fewer fasteners overall, which translates into labor savings for the contractor (Figure 10).

Further, a higher density of fasteners and plates in perimeter zones and corner areas, according to design criteria, can meet



Figure 6 – Typical roof perimeter.

added wind uplift forces. Induction welding thus eliminates the need for multiple courses of membrane half-sheets in order to picture-frame the roof—further reducing seaming labor. Most importantly, it simplifies roof design, enabling the least-experienced crew members to contribute to daily production.

**SUMMARY**

Labor shortages have taken their toll on the roofing industry, though not all of the news is bad. The development of prefabricated roof membranes, flashings, drainage, and perimeter components has



Figure 7 – Induction welding tool.



Figure 8 – Weighted magnetic heat sink to ensure bond.




Figure 9 – Induction welding production process.



Figure 10 – Metal roof recovery combining purlin fastening and induction welding.

significantly reduced the amount of skilled labor necessary to accomplish seaming and waterproofing at critical locations on the rooftop. Couple this with induction welding technology for membrane attachment, and a contractor has a successful formula for roof installation under a variety of conditions.

While these systems offer a great place to start, prefabrication and induction welding are not the only solutions needed to address the shortage of skilled labor in the roofing marketplace. Building a future workforce will require recruitment, education, and training in many academic and

vocational settings. However, these systems do provide the bridge between today and tomorrow. In short, they allow a low-slope roofing project to be accomplished with a compact, productive crew made up of roofers with varying skill levels. 



Scott Bieber

*Scott Bieber is the business development manager for Duro-Last Inc., based in New England. A graduate of Cornell University and a 36-year veteran of the roofing industry, Scott has worked for Duro-Last in multiple capacities since*

*1988, including vice president of sales. He previously led sales and marketing teams for other construction materials manufacturers. Scott is a member of RCI's New England Chapter.*

## Tariffs on Foreign Solar Panels Could Cost U.S. Jobs, Raise Costs

A tariff of 30% will be applied to imported solar panels, most of which come from China, after the International Trade Commission (ITC) determined that imports of the panels have hurt American companies. Tariffs will be in place for three years and will then decrease, and are meant to provide “breathing room” for industries trying to adjust to a surge in foreign competition, according to a spokesman with the ITC. Tariffs have also been imposed on large foreign-made residential washing machines.

In implementing the tariffs, the Trump administration invoked a trade law from 1974 that allows the president to raise tariffs as high as he wants. The actions are a demonstration of Trump’s “America First” agenda and his latest action against the renewable energy industry. U.S. solar panel manufacturers Suniva and SolarWorld filed a petition in 2017 with the ITC to investigate the sale of solar panels well below typical U.S. prices—a practice known as “dumping.”

The solar panel tariff is a blow to China, the primary country from which the U.S. imports panels, but it will also put U.S. solar installation jobs at risk as a result and likely raise solar installation costs. Overall, about 260,000 Americans work in the solar industry, up 24% from 2015, according to the International Renewable Energy Agency. The Solar Energy



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Industries Association warned the administration that such an action could put 48,000 to 63,000 American solar industry workers out of a job this year. Advocates for the renewable energy industry claim the move will handicap a \$28 billion industry that relies on parts made abroad for 80% of its supply.

This is the latest action by the administration undermining the domestic renewable energy industry. Trump had already decided to pull the U.S. out of the international Paris Agreement on climate change, rolled back Obama-era regulations on power plant emissions, and passed sweeping tax reforms that constrained financing for solar and wind power. The import taxes, however, appear to be the most targeted strike on the industry yet.

The American Council on Renewable Energy has claimed the tariff will cause electricity prices to rise.

— CNN Money and Time.com