

# Sure-Weld® TPO

Roofing Systems

## CASE STUDY

### Restoring the Beauty & Integrity of Fuller's Geodesic Dome



#### JOB PROFILE

**PROJECT LOCATION:**  
Carbondale, IL

**CARLISLE APPLICATOR:**  
Allstar Roofing

**BUILDING ARCHITECT:**  
Design Works

**GENERAL CONTRACTOR:**  
Dome, Inc.

**PROJECT DURATION:**  
July 2014

- ROOFING SYSTEM:**
- » 60-mil Sure-Weld TPO fully adhered over ½" SecurShield™ HD Polyiso
  - » SecurShield HD adhered with FAST™ 100 Adhesive

Richard Buckminster Fuller, fondly referred to as Bucky, was an American architect and systems theorist well known for many ingenious inventions in the field of architectural design but perhaps best known for his popularization of the geodesic dome. The first geodesic dome was constructed in July 1926; however, it wasn't until more than twenty years later, when Fuller developed the mathematic construction of the dome, that this unique structure became popularized. The Montreal Biosphere and Spaceship Earth at Epcot® are arguably the most recognizable geodesic domes existing today—second only, of course, to the historic home of Bucky Fuller himself.

The historic residence of Anne and Bucky Fuller was originally constructed in approximately seven hours on Tuesday, April 19, 1960 in Carbondale, Illinois. Known as the Fuller Dome Home, this structure is a cherished landmark in the hearts of Carbondale residents, some of whom, in 2002, formed the RBF Dome NFP with the purpose of preserving the Fuller Dome Home for future generations. The RBF Dome NFP is dedicated to completing a full, historically accurate restoration of the Fuller's home, a restoration which began in 2014.

Because of the home's unique design, the team from Design Works—the Carbondale-based architecture firm in charge of the restoration—knew that choosing flexible, cutting-edge building products would be a priority for this project. The exterior renovations performed under the direction of general contractor Dome, Inc., would include removal

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and replacement of the existing roofing system, removal and replacement of portions of the geodesic components and restoration of the original windows and doors. All of these components would also involve stabilizing the entire structure in order to restore the dome to its original geometry and structural integrity. This complex renovation would require extreme attention to detail in design, choice of building products and construction.

Dome Inc.'s excellent work in stabilizing the geodesic structure was paramount to this restoration project.

The 1,675-square-foot rooftop presented a particular challenge to the architects because of its unique shape and the need to match the smooth, aesthetic appeal of the original 1960s roof. They chose to use Carlisle SynTec's 60-mil white Sure-Weld TPO membrane to cover the rooftop of the three-eighths-sphere building. Carlisle's Sure-Weld TPO provided the long-term durability and installation flexibility needed for this installation. The white TPO membrane also enabled the architects to match the specific white and blue colors of the home's original roof coating with the use of custom-colored acrylic coatings.

The rooftop not only presented a challenge in product choice, it also presented a challenge to the installation team from Allstar Construction. The geodesic dome consists of six pentagons and five hexagons that are comprised of three modular struts of various lengths that form a total of sixty triangular panels. In addition to the challenging shape of the building, the rooftop itself included a variety of penetrations, including ten flat-panel skylights that needed to be set flush with the roofing membrane to match the historical appearance required by the Save America's Treasures (National Park Service) Grant. All of these components required that the Allstar team execute the highest quality of workmanship while paying strict attention to detail.

The existing roof had significantly deteriorated over the years and, by 2014, portions of the geodesic frame were rotting and causing multiple interior leaks. The preservation of the roof would require correcting the deteriorating portions of the frame, re-sheathing the entire dome structure and installing a new TPO roof system. Allstar's team began construction by tearing off the existing roof system, which consisted of two-to-three layers of asphalt shingles installed on top of the original roof system, which consisted of elastic taped joints at the edges of the roof sheathing with an exterior paint-on coating.

Once the existing roof system was removed, the team began the meticulous process of installing the new system. First, all of the

wood sheathing had to be inspected and the insulation joints had to be sanded in order to achieve the desired aesthetics. Next, each of the sixty triangular pieces of Carlisle's ½" SecurShield HD polyiso insulation were bevel-cut to match up with the adjacent pieces of insulation. The insulation was adhered to the plywood roof deck with Carlisle's FAST 100 Adhesive. Because of the various slopes on the geodesic roof, the insulation was temporarily fastened with screws and insulation plates to allow the FAST 100 Adhesive to cure. Once the adhesive was cured and the insulation was solidly adhered to the roof deck, the temporary fasteners and plates were removed and the TPO membrane was cut into sixty matching triangular pieces and fully adhered to the insulation with solvent-based bonding adhesive. At each splice, caulk lines were marked to ensure that the TPO flashing overlapping the splices was set perfectly straight, with no more than ¼" change in straightness.

Once the TPO membrane was installed, the rooftop was pressure-washed to test the water-tightness of the system and to restore the membrane to its original whiteness. Two custom-color acrylic coatings were then applied to the membrane to replicate the original colors of the Dome Home rooftop, which consisted of white on the upper regions of the dome and blue on the lower regions, creating a resemblance of white clouds over water and reflecting Fuller's fondness for the ocean.

The entire rooftop installation was completed inside of a temporary exterior dome that was constructed to ensure that the project would not be delayed by weather or any other external factors. The rooftop restoration, which began on July 9, 2015 was completed in less than a month. Covered by Carlisle's 20-year Total System Warranty, the new rooftop will provide the Dome Home with much-needed long-term protection from the elements while helping to restore its original owners' vision of structural integrity and picturesque design.

While Carlisle manufactures single-ply membranes for use on commercial projects, this is a unique application. "We are extremely pleased that Carlisle Sure-Weld TPO was selected for this building, especially considering the contribution of Buckminster Fuller to the architectural community," said David French, Marketing Manager for Carlisle Construction Materials.

With exterior renovations now complete, work is underway to preserve the interior of this historic structure and the surrounding grounds. Learn more about the Fuller Home Dome at [www.fullerdomehome.com](http://www.fullerdomehome.com).