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ARCHITECTURAL **ROOFING** & WATERPROOFING

INNOVATIVE ROOF SYSTEM @
**SPACEPORT
AMERICA**

Kynar Aquatec®

- by Shawn Carney
and Brian Day,
United Coatings

AS ALSO SEEN IN *ROOFING CONTRACTOR* MAGAZINE!



When most people think of New Mexico, they think of the muted adobe buildings of Sante Fe or the famous natural wonders of Carlsbad Caverns or White Sands Natural Monument. What they probably don't picture is the world's first commercial spaceport for launching customers into space; but that's exactly what they would find in the southern part of the state.

A visionary project of the New Mexico Space Authority (NMSA), a state agency created to develop commercial space travel, Spaceport America will be home to Virgin Galactic's spaceflight program. Its smooth, spaceship-like design lies low within the desert, blending the feeling and mystery of space flight with the color and character of the New Mexico landscape. Using local materials and construction techniques, the high-performance facility is both sustainable and environmentally conscious.

Iconic Design

Working in collaboration with the design and engineering teams from Foster + Partners and URS Corp., New Mexico's SMPC Architects served as the architects of record for the \$35-million sinuous-shaped building. Its unique design called for minimal

impact to the viewshed as seen from the historic El Camino Real Trail, while providing the NMSA and Virgin Galactic with an iconic building for their headquarters and space flight operations. "The result was a magnificent, one-of-a-kind facility built in harmony with the natural surroundings of the area," said David Hassard, principal architect in charge of the project at SMPC.

Officially named "Virgin Galactic Gateway to Space" at a dedication event on Oct. 17, 2011, the three-story terminal hangar facility is cut into the existing sloping grade, and its earth-toned exterior resembles the low, rolling hills of the surrounding desert. The 110,000 square foot structure, which is designed to achieve LEED Gold certification, includes administrative facilities, hangar space for the planes and spaceships, pre-flight and post-flight training areas, mission control room, and lounges. Notable features include 60-foot roof height, a viewing gallery with large windows facing the runway, arcing hangar doors that span 160-foot wide openings, passive heating/cooling and natural lighting, and a rolling roof whose shape resembles a manta ray.

Innovative Roofing System

The uniquely shaped roof of the terminal hangar facility consists of 12 primary undulating steel trusses spanning over

180 feet with a 45-foot cantilever at the eastern edge, a blackened stainless steel bull nose edge around the perimeter, a U-shaped clerestory in the center, and 42 skylights on top. The roof assembly was provided by Firestone Building Products, which was recommended by Upland Corporation (Firestone's local representative) and installed by Progressive Roofing LLC, consisted of 90,000 square feet of 60-mil EPDM membrane that was fully adhered to ½-inch ISOGuard™ HD cover foam board and three layers of 2-inch ISO to achieve a minimum thermal insulation value of R-38. "Underneath the metal deck is a medium density sprayed cementitious fireproofing that provides additional insulating qualities," added Hassard. "The deck also has an air space, underlayment gypsum sheathing board, and a vapor barrier to complete the fire-rated assembly."

After installation of the EPDM membrane, the entire roof assembly was power washed with United Cleaning Concentrate (UCC) prior to applying an ADHERE-IT® rinse primer to the EPDM surface, which was then pressure washed after 15 or 20 minutes. A ROOF MATE™ coating for waterproofing, which provides a highly coherent bond to the subsequent Kymax® coatings, was then sprayed down at 100 percent coverage and back rolled to make sure it adhered nice and solidly. A Kymax®

Spaceport America

■ Spaceport America, located near Las Cruces, N.M., is the future home of Virgin Galactic's sub-orbital spaceliner fleet. *Photo courtesy of Foster + Partners/Photo: Nigel Young.*

basecoat was applied next using airless sprayers at 100 percent coverage, followed by three Kymax topcoat finishes at various coverage percentages to artistically create the desired mottled appearance. The UCC, ADHERE IT, ROOF MATE and Kymax products were all supplied by United Coatings, a Quest Construction Products brand.

Extreme Weatherability

"In this part of the country, there is concern about heat gain and degradation of roofing materials over time due to the extreme weather conditions," said Steve Elsley, project manager for Progressive Roofing. "As such, durability and sustainability of the color are two very important performance considerations when choosing a topcoat finish. "Based on our experience, the Kymax coating holds up very well under demanding weather conditions and



also comes with a 10-year warranty against cracking, delamination, and discoloration."

Kymax coating is a thin-build elastomeric coating that provides long-term color stability, resistance to dirt build-up, and protection against severe weather conditions. It is based on Kynar Aquatec® latex,

an emulsion-based PVDF fluoropolymer technology developed by Arkema Inc. that provides similar durability and performance as Kynar 500® PVDF resin-based coatings. However, unlike factory-applied Kynar 500 resin-based coatings, coatings based on Kynar Aquatec latex cure at

■ The rooftop of Spaceport America's terminal hangar facility was topped off with three different colors of Kymax coatings to achieve a mottled finish, enhancing the facility's organic appearance. *Photo courtesy of Foster + Partners/Photo: Nigel Young.*





■ Many coated EPDM samples were created using various application techniques to get the mottled appearance, and the final 15 x 30 foot piece was temporarily installed on the roof for final approval. *Photo courtesy of Progressive Roofing.*

The three-story terminal hangar facility is cut into the existing sloping grade, and its earth-toned exterior resembles the low, rolling hills of the surrounding desert.

ambient temperatures, meaning they can be field applied to a variety of substrates, including metal, PVC, SPF, concrete and wood, and as a finish coat over acrylic basecoats. Another benefit of the coating is the potential energy savings created by its ability to resist biological growth and other external factors that reduce the reflectivity of traditional roofing materials.

Stealth Finish

In addition to protecting the EPDM with a “light-sandy-colored” Kymax® basecoat, the plan called for three additional layers of Kymax coating to achieve a mottled finish and mimic the coloration of the surrounding landscape. To facilitate the artistic application process, Foster + Partners provided a series of computer-generated drawings of the entire roof showing the desired colors and where the coatings would go down in terms of the percentages. The first top coat was a light tan color (RAL 8011) at 75 percent coverage, the second top coat was reddish brown (RAL 8014) at 65 percent coverage, and the third top coat was a mocha color (RAL 8001) at 35 percent coverage.

“The trickiest part was finding the optimal application technique for replicating the original faux finish mockup,” said Hassard. “The team experimented with different approaches of spraying, rolling and brushing the coatings on the roof and we tried spraying at different intervals in different ways and in different combinations for all of these different application approaches. We even tried using special rollers that had an unevenness associated with them so they wouldn’t create a solid coverage with one pass.” From April to October 2010, the team created many different samples using various application techniques to get the mottled appearance, as well as to confirm the color formulation for each of the coats. The final mockup (trial assembly) was a 15-foot-by-30-foot piece of EPDM that was coated in Progressive Roofing’s yard and then temporarily installed on the roof of the terminal hangar facility for final approval.

The sequence and application method had a great bearing on the success of this critical phase of the project. Relying on a spray technique allowed Progressive Roofing to achieve that unique faux type finish because if they tried to roll on the coating or apply it by some other application method it would just go on too heavy and not allow the applicator to effectively blend in the colors together.

Eye on the Skies

Weather is a major factor in applying coatings and one of the biggest challenges that the roofing contractor dealt with in this project. The temperature has to be at a minimum of 50 degrees Fahrenheit for two hours before application can start, and the wind has to be 15 mph or less to spray on the coating. As historically, the weather would not allow the coatings to be applied before mid-Spring, it was decided to start applying the coatings in May. Due to winds and temperature conditions, however, the start date was pushed back to the first week of June.

“The winds were our biggest enemy,” said Elsley. “We would actually have to start at dawn and work until about 10 or 11 a.m. each morning and at that point the winds would get too strong where we

Spaceport America

couldn't spray any longer. In addition, the altitude at the spaceport is 4600 feet above sea level, and it is not uncommon to have 35 degree temperature swings in a 24-hour period during this time of year. Dealing with these types of temperature variations were also challenging."

Approximately 600 gallons of the Kymax coatings were applied, working from the perimeters of the roof towards the center. "We were very pleased with how the spray technique worked," said Elsley. "We achieved the desired mottled and four-colored appearance by using different nozzles so that we didn't get 100 percent coverage, and it allowed us to do final touchups to take out some of the high and low spots so there wasn't as much contrast."

"The Kymax coating also mixed and sprayed very well," Elsley added. "We have used EPDM roofing systems for over 30 years and have sprayed millions of square feet of coatings. We use Kymax coating all over the place, and we will definitely use it again, especially in projects requiring custom color and where customers want a high quality coating that will keep that color for 10, 15, 20 years or more."

For more information on Kymax coatings, visit www.unitedcoatings.com. For more information on Kynar Aquatec, visit www.kynaraquatec.com. For more information about Firestone EPDM roofing systems, visit <http://www.firestonebpc.com/roofing/epdm>. **ARW**



■ Now open for business, the "Virgin Galactic Gateway to Space" at Spaceport America is the world's first commercial spaceport terminal. Photo courtesy of Foster + Partners/Photo: Nigel Young.

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