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Custom Canopy Scores Goal for New LIVESTRONG Sporting Park continue

And expectations were high for this new \$200 million home of Sporting Kansas City, the soccer team formerly known as KC Wizards. After shuttling from one venue to another for 15 years, they now call home one of the world's most sophisticated stadiums, designed to evoke the soaring curve of the soccer ball and the athleticism of the players.

The firm responsible for design engineering of the stadium's canopy – the largest polycarbonate stadium canopy in North America – is Duo-Gard Industries Inc. Located in Canton MI, Duo-Gard specializes in custom design, engineering and fabrication of architectural canopies, often involving high-performance polycarbonate glazing technology and structural framing innovations.

“Meeting the architect's demands for this unique project was a function of understanding a multifaceted challenge,” said David Miller, Duo-Gard's president. That challenge included several specific goals for the stadium's polycarbonate canopy, more than 1800 feet long, ranging from 25 feet to 70 feet in depth.

The structural demands were extraordinary. In meeting them, Duo-Gard's engineers created a low-profile, long-span system with performance and savings unprecedented in the industry.

“One impetus for the canopy was to provide an intimate environment that would amplify the crowd's noise; that's why we covered every seat. Another factor was shading the crowd without shutting off the sunlight we needed to maintain the natural grass that Major League Soccer prefers,” said Spear. He said they wanted to avoid grow-lights while ensuring that the field had the best opportunity to flourish.

The design team evaluated several alternatives. Fabric didn't offer the required hard surface. ETFE pillows didn't give the desired appearance. And the weight of glass panels at the desired spans would have required significantly more costly steel substructure.

Spear said the design team then considered translucent polycarbonate: “Its hard surface accentuates sound. It disperses natural light. It resists hail and other impacts. Plus it spans further with less weight than glass.”

And aesthetics played a part, he added: “With glass, you could see clouds and sky, but the translucent polycarbonate adds a sparkle that switches between the sunlight and the stadium lights that makes it more interesting.”

However, Miller said the structural demands of low slope and low profile made it more interesting – and infinitely more challenging – for Duo-Gard's team, requiring a 1/12 pitch, a 12-foot span between structural members and exceptionally high loading.



“This kind of span hadn’t been done before by anyone with polycarbonate slight slope,” Miller said. “Or engineers broke ground with this.”

The canopy actually integrates two complementary components. The steel structure is cantilevered 95 feet and supports a metal deck that flows into the two-tiered polycarbonate deck cantilevered three feet off the metal. The glazing is 25mm triplewall clear polycarbonate, allowing 80% light transmission. Duo-Gard’s aluminum framing system features a specially engineered base plate, pressure plate and curved cap that conceals the fasteners.

“It sports our new 3 ½” profile in 32” on center to minimize shadowing and maximize sunlight transmission to the field,” said Frank Kosciolek, Duo-Gard’s Engineering Manager. He compared it to the industry’s typical systems with a 7” profile at 24” on center, throwing out much more shadowing and requiring an additional steel purlin.

“Our capability for 32” on center allowed us to eliminate the extra purlin, resulting in 35% less metal required. That’s a significant savings on a project of this scope,” Kosciolek said.

He added that Duo-Gard successfully tested the system at 150% of the required loading, which was more than double that for most canopies. Plastic channels at the top and bottom of the translucent panels enhance the “floating effect” of the canopy. Special flashing and expansion joints complete the system.

Kosciolek said installation of the canopy involved additional challenges that required close collaboration among Duo-Gard, general contractor Turner Construction and installing contractor A2MG. “Working with the long span and low slope, especially at 100 feet from the ground, was the most significant challenge,” said Chris Mann, project manager for A2MG. “Yet it’s a simple system, easy to handle. It turned out great.”

Duo-Gard’s David Miller said the project was the company’s largest and most challenging to date: “We’re very proud of our contribution to LIVESTRONG Sporting Park. It demonstrates both our desire and our capability to collaborate with the architect to achieve something spectacular.”