

Silicone innovation powers new trends in construction

Innovative Solutions



World-class architecture has always been a delicate balance of form and function. As cities seek to create distinctive skylines to foster civic pride and attract greater international recognition, architects and contractors need to meet the challenges of new requirements for safety and the environment.

“In addition to meeting traditional safety, design and functional specifications, we see major external trends that are changing the way all types of structures are designed and built,” explained Bob Schroeder, industry director (Americas) for Dow Corning’s construction business. “These affect everything from high-rise office buildings and convention centers to athletic stadiums and transportation hubs.”

Concern about the risk of terrorism has heightened around the world, creating more demand for buildings that protect both the structure and the inhabitants. In many countries, building owners want their facilities to better withstand the effects of violent storms. And from both governments and the public alike, there are increasing demands for structures that are sustainable and meet environmental considerations. Taken together these trends require greater industry expertise, innovation, and solutions to address a wide range of issues.

Green construction

“One very important industry trend has been the growing emphasis on sustainable, or green, construction,” Schroeder continued. “Years ago, structures that were built for world fairs were sometimes demolished – often soon after the event finished. It was a tremendous waste of limited resources and just what the principle of sustainable construction is meant to avoid.

“Today, sustainable design has been recognized by the industry and the public as a critical factor in achieving high-quality architecture and

benefiting the building owners, the companies that occupy these structures, and the wider community.”

Architects therefore work to identify ways to repurpose structures in order to increase their usable lives after one-time world events have ended. One example is the Lisbon Expo ‘98 project, called the Gare do Oriente, the largest urban regeneration project in Europe. Buildings erected for the Expo were repurposed for long-term use as a transport interchange for rail, bus and metro links.

Dow Corning assisted this development by providing expertise and materials to provide aging resistance, protection from hot and salty sea air, adhesion, and elasticity to accommodate structural movements. Sustainability is especially important for sports venues, which are often constructed for single events such as the Olympics or World Cup matches.

“We work with architects and developers to plan in advance how venues can be integrated into the surrounding community once the games are over,” said Schroeder. “After all, events like the Olympics and the World Cup last only about 20 days, while well-built stadiums can last a lifetime.”

The Athletes Village in Sydney is a prime example. Designed to accommodate more than 15,000 athletes, when the Olympic Games were finished the entire complex was turned into a new residential suburb. It was proposed to convert the facilities into a primary school, shopping center, and additional residential facilities in order to more fully integrate the complex into the city’s infrastructure.

“The emphasis placed by the developers was on a long-term, sustainable approach to construction, which has ensured that the Athletes Village will be a legacy that future generations will enjoy far more than a single sporting event or simple tourist attraction,” said Schroeder. “We’ve had considerable experience in this field – Dow Corning’s technical leaders and materials have been involved in most of the summer Olympic Games. Dow Corning also contributed expertise and products for the construction of four stadiums for the

FIFA World Cup in Korea and Japan. Products included structural and non-structural sealant applications, and panel cladding that enabled advanced building designs.” Architects also work to bring the outdoors inside with designs that increase natural daylight, giving a sense of spaciousness and a connection with nature.

Dow Corning products and expertise make it possible to design structures incorporating large expanses of glass that can create spectacular visual effects. Beyond the aesthetic advantages, the natural lighting provides very real benefits to athletic events themselves – extensive use of glass reduces shadows on the field of play that can distract players and create problems for TV filming and event photography. For fans, it means fewer pillars that block their view.

Safe construction

Architects and construction companies are also responding to demands for improved structural safety against violent storms, such as hurricanes and tornadoes, and increasingly from the threat of terrorism around the world.

“Our people work closely with companies that are designing and constructing buildings. We advise on safety features. We participate in public and industry education as a member of the Protecting People First Foundation, which was founded in the wake of the 1995 Murrah Federal Building bombing in Oklahoma City,” said Schroeder.

The Protecting People First Foundation campaigns for increased use of lifesaving blast-resistant windows with protective glazing, following congressional reports that indicated many lives were lost because of flying glass. Federal buildings now require windows to be designed to provide protection against potential threats.

Dow Corning provided window safety testing and consulting services at the Pentagon, a collaboration that was featured in a case study presented at a Foundation symposium titled: “Saved by a Window: A Case Study of the Pentagon’s Blast-resistant Glazing and the Lives saved on 9/11”.

Design solutions

Some developers present unusual challenges that require innovative solutions. “One developer came to us with an unusual problem involving the gymnastics and fencing facility for the 1988 Olympics in Korea,” Schroeder explained.

“Energy in Korea is very expensive, so the less electricity required the better. Because Olympic events are televised, the developer needed significant lighting to broadcast the competition on television. Our solution involved developing a silicone-coated fabric roof with light translucency properties that let in natural light while providing acoustical benefits. We provided an outer skin, an inner blanket of insulation and an acoustical liner, which were cable-suspended. All this sandwiched together still allowed approximately 15 percent light penetration. The cost for the fabric roof with light translucency was in line with the cost of a conventional roof.”

Spectacular landmarks

Schroeder noted that there is a fourth trend emerging – the number of cities around the world that want world-class structures and dramatic architectural features to act as city and national landmarks. Sometimes the desire for increased tourism revenue is the driving factor, but there is an equal number of cities interested in creating symbols to foster local pride.

A prime example is the British Airways London Eye. Originally created as a temporary feature to mark the millennium, this structure proved so popular that it has remained in its landmark location alongside the River Thames. The wheel consists of 32 glazed capsules, each of which carries 25 people on a rotating 135-meter diameter wheel. The oval capsules, completely enclosed by curved glass, were designed to withstand a 174-mph wind with glass strong enough to take the weight of 25 people standing on it.

Dow Corning contributed both expertise and products that enhanced strength and durability while providing both fire resistance and explosion-proof properties.

Another architectural marvel, the Guggenheim Museum in Bilbao, Spain, offers free-flowing lines and form, standing in stark contrast to the low-lying art deco buildings surrounding it. Silicon-based materials help it withstand structural movement, offer protective qualities, and provide weather-sealing properties.

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