

CASE STUDY

China Central Television



2008 was a big year for China as Beijing had won the bid to host the Summer Olympics. The Chinese Government had grand plans to prepare their country as host nation for this worldwide event. Included on the list was a state-of-the-art, eye-catching facility from which China Central Television could share the Olympics with the world.

A Geometric Wonder Standing in a Seismic Zone

GE Silicone and Comprehensive Technical Expertise Critical to CCTV Construction

THE CHALLENGE:

Connecting Two Buildings in a Seismic Zone

The winning design, shaped like two "L" shaped high-rise towers linked at the top and the bottom at an angle to form a loop, best described as a "Z criss-cross," was planned for a modest 234 meters. However, the building's unique shape created an irregular grid on the building's façade with an open center, a challenge for a structure that connected two separate buildings on a foundation in the middle of an earthquake zone.

Constructing 27,400 Pieces Safely and Quickly

The building, centered with a curtainwall façade, required 27,400 pieces, all of untraditional shapes and sizes, to fit within an irregular structural frame totaling 100,000 square meters (~1.1 million square feet). In addition to the many pieces, the designer and the fabricator determined that the safest way to construct the many pieces into a "Z" shape was with "L" shaped joints, which were longer in vertical length than horizontal length.

The challenges mounted: irregular geometric pieces take longer to manufacture and install; safety for everyday use and within seismic conditions was paramount; and the international stage of the Olympics presented a hard, quickly-looming, deadline.

Location:	Beijing, China
Challenge:	The building's unique shape created an irregular grid on the building's façade with an open center, a challenge for a structure that connected two separate buildings on a foundation in the middle of an earthquake zone.
Number of Floors:	49 floors
Building Height:	234 meters
Structure:	Shaped like a "Z criss-cross" in Beijing's central business district; within an earthquake zone.
Products:	GE SSG4400 UltraGlaze*, GE SSG4800J UltraGlaze* (custom multi-part mixture), GE SCS2903 SilPruf*, Pensil 300



imagination at work

THE SOLUTION:

Excellent Technical Support and Sealant Mechanical Properties

The Chinese Government selected Beijing Jangho Curtain Wall Co., Ltd., the second biggest curtainwall fabricator in China, as the façade fabricator. The manufacturer of GE sealants and Jangho have had a strong history of collaboration and success.

"We needed a partner who had both a technical product advantage and the ability to manage the inevitable technical challenges that would come in creating a building with such an unusual design," says Zhang Sheng, vice president at Jangho.

While Jangho recognized GE Sealants as excellent products, it would take more than that to construct the China Central Television (CCTV) building. Basic geometry implies that two equal size triangles will create four-sided shapes. The challenge was taking irregular geometric frames with lots of triangles within a system designed around rectangular calculations. Assembling such panels makes the dimensions difficult to control, so every millimeter counted, and excellent adhesion and flexibility to stick on the panels was critical.

In addition, to meet earthquake safety standards, the fabricator selected dual-laminated insulating glass, so the structural sealant needed to be applied into an "L" joint through narrow openings. Conventional SSG joints require a +/-12.5 percent movement. In examining the "L" joints needed for the project, the sealants team of technical experts determined that a +/- 15 percent movement was necessary.

"The technical experts for GE sealants spent countless hours working with our design department and going back and forth between the work site and our Beijing plant to find a solution for the uniquely sized pieces and "L" shaped joints," says Sheng. "Together we tested to find the right product that had the product consistency to fit within the sealant joints; and that is why we selected GE sealants for the CCTV."

Redefining Limitations

The technical experts for GE sealants had clear challenges to consider in recommending the right mix of products. The design

process resulted in two towers that, as independent towers, were prone to movement from the wind and surface temperature variations due to the amount of direct sunlight or shade on any given elevation.

GE SSG4400 UltraGlaze*, a high-strength, two-part elastomeric adhesive sealant for structural bonding, passes the ASTM C719 movement test at Class 12.5. Due to the large size of glass and the "L" shaped joints, +/-15 percent movement capacity was deemed necessary for this design. The sealants team conducted multiple tests on the work site and at Jangho's lab to help determine that, with its excellent processing and flowability (which allowed the sealant to get within the uniquely shaped joints), coupled with its ability to accommodate the additional 15 percent movement, SSG4400 had the properties needed to successfully and safely construct the building.

Through a thorough analysis and deep technical discussions between the fabricator curtainwall providers and the sealants team, it was determined that SSG4400 would be "pumped" into the uniquely shaped joints. The consistency of SSG4400 in testing proved to be both viscous enough to hold the joints stable during the cure phase, as well as capable of flowing into tight spaces while thoroughly filling the cavity within.

THE RESULT:

The CCTV building was completed in January 2008. Start to finish, the façade fabrication took about 18 months—six months quicker than the average for a building as complex as CCTV. To stay on track with the aggressive timeline, Jangho ordered all of the aluminum extrusions and pieces prior to involving the sealants team. If Jangho, with the help of the sealants experts, hadn't found a solution to the "L" shape joint, the project would have been significantly delayed and the original aluminum order would have been wasted.

"One of the reasons we partner with the manufacturer of GE sealants is because we are a local company and they are a global company," says Sheng. "Once again, they helped us with global experience, tapping into their experience so that we could best serve our customer through their sealant laboratory and excellent training programs."

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