RUSKIN®

Case Study

BC Place, Vancouver, British Columbia

Architect
Stantec

Engineers
Geiger Engineers – structural engineer (roof)
Schlaich Bergermann and Partner (SBP) – consulting engineer
WSP (formerly GENIVAR) – structural, mechanical and electrical engineers

Contractors
Fred Welsh Ltd Mechanical Contractors,
Northwest Sheet Metal Contractors
PCL Constructors Westcoast Inc.

Ruskin Products
ELF375DX, CD50, Factory Furnished Acutators

SITUATION

BC Place is an icon of British Columbia. From the water, or from the sky, views of Vancouver's downtown skyline are punctuated by the retractable stadium roof. Ruskin and its representative in Vancouver, were deeply involved from start to finish with both the aesthetics and ventilation control of the stadium redesign. The concept was to take what at one time was the world's largest inflatable air supported roof and convert it into a retractable dome with the largest cable-supported roof in the world.

"This investment in our future is expected to create 3,000 person years of employment and ensure British Columbia has a world-class stadium for decades to come," said the BC Minister of Tourism Culture and the Arts at the beginning of the roof project. "A new retractable roof will allow us to attract a broader range of sporting and entertainment events, and continue to host the province's largest consumer shows and cultural events that benefit Vancouver and our entire province."

The completed roof is the largest cable-supported, retractable fabric roof in the world at more than four hectares (10 acres). The design allows for the retractable membrane to retract into the center of the roof opening and be hidden inside a suspended, four-sided electronic video board, without compromising sightlines. The roof is able to open or close within 20 minutes. The roof has been designed to handle a snow load of 7,000,000 kg.

Today, BC Place is home to the Vancouver Whitecaps FC of the MLS, the BC Lions Football Club of the CFL, and the BC Sports Hall of Fame. Regarded by many as the premier stadium venue in Western Canada, BC Place is busy 250 days of the year. Since reopening in 2011, BC Place has welcomed more than 1 million guests each year to world-class entertainment events, professional and amateur sports events, community gatherings and exhibitions.

RUSKIN CHALLENGE

Ruskin worked closely with Stantec Architects and Genivar Mechanical Engineers creating a louver and damper design that surrounds the stadium. BC Place was technically a very complex design, engineering, and construction program with many logistical constraints, including heavy construction operations in a congested urban location. With only five months' lead time to bring 18,000 tons of steel, 35 kilometers of cables and many other custom-made products to the site from other parts of the world, the schedule was tight. Two full-time staff members were dedicated to working directly with international suppliers to check on quality control and ensure timely shipments.

RUSKIN SOLUTION

What appear to be curved louvers are in fact 36 specially designed sections of approximately 19 meter lengths canted outward. Behind each louver is an actuated bank of low-leak aluminum airfoil control dampers. The louvers/damper assemblies are located under the structural "ring beam" at top of stadium under rows of light panels. Crucial to the success of the project were shipping and packaging requirements. Shipments were coordinated in 53 foot trucks timed alternately to arrive at job site in stages from 2 different manufacturing plants. To protect the finish of the louvers in transit, a special 3 mil plastic adhesive film was applied to them. Special crating was also required.

The louvers, with architectural style mullions, are installed facing exterior and the dampers the interior with the actuators in between. Ruskin provided engineering documentation to change the specified actuator, which was scheduled to be discontinued,

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RUSKIN SOLUTION *(continued)*

to a Belimo model that worked well in this application. Unique issue of actuator maintenance was solved with removable blades at the bottom of each CD50 damper. The assembly is sloped outward at 19° to follow the roof line. Genivar engineers performed computer modeling to determine the most efficient height for optimal natural ventilation and the result was a 2.2m high opening around the entire perimeter of the stadium. The natural ventilation design eliminated the 16 giant fans utilized in the old inflatable roof design and will save significant dollars in energy cost every year.

SUMMARY

The remarkable revitalization of BC Place Stadium continues to receive awards and accolades since opening in 2011, including 'Project of the Year' at the prestigious Stadium Business Awards in May 2012 in Turin, Italy. Also in 2012, Geiger Engineers and GENIVAR received an Award of Excellence from the Association of Consulting Engineering Companies of Canada and in 2013, the new BC Place was awarded the Engineering News-Record (ENR) Global Best Project Winner for Sports/Entertainment.

The *Vancouver Sun* newspaper went on to say this about the project. "It's anticipated that the new roof will extend the life of BC place 40 years or more. By creating an entirely new guest experience, BC Place will be able to attract a whole new class of event that will make BC Place an even greater economic generator by attracting more business.

We're also proud of the hundreds of professional men and women who crafted this massive and complex construction project. They include locally-based ironworkers and other highly-skilled tradespeople who frequently work late hours on a very tight schedule to ensure that the new BC Place was built right – and on time."

Ruskin ELF375DX louvers were installed at a 19° degree outward sloped angle facing the exterior and CD50 low leak dampers with factory actuators facing the interior. Unique issue of actuator maintenance was solved with removable blades at the bottom of each CD50 damper.

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PRODUCT DETAIL

ELF375DX
Architectural Drainable Louvers

Ruskin ELF375DX louvers were combined with Ruskin control dampers to provide the means necessary to allow natural ventilation below the roof line in the redesigned stadium. Anodized finish was applied to protect the louvers in this oceanic climate.

CD50
Aluminum Airfoil Control Dampers

Ruskin low leak control dampers with factory furnished and mounted actuators are opened and closed based on outdoor air conditions and the indoor air conditions required in the stadium.