La Macarena

By Mauricio Gutiérrez Villa

This South American bullfighting arena was renovated to include a partially retractable structural steel roof system.

Lacking venues for concerts and events, the city of Medellín, Colombia chose to reconfigure its 1940's era bullfighting ring, La Macarena, as a multi-purpose arena. In the process of renovating and upgrading the concrete structure for seismic resistance, the city added a partially-retractable roof structure framed in structural steel.

The main challenge of the project involved creating an up-to-date multi-purpose venue while maintaining the arena's vintage 1940's architectural elements. Renovating the stands and press facilities, installing a moving roof, increasing capacity from 8,000 to 13,500 spectators, improving access to the stands with steel and concrete hanging walkways and complying with the requirements of the local fire department and seismic codes also became part of the agenda.

Open and Shut Case

The arena's retractable roof—consisting of two "eyelid" panels that move along rails at a rate of 15′ per minute—is the first of its kind in Colombia. It takes 3.5 minutes and 16 motors to fully open and close the roof's panels. Because the roof called for long span super-trusses, structural steel was chosen for this project. The fixed roof weighs 560,000 lb, while each eyelid weighs 44,000 lb. The diameter of the building is 253′, and the roof is 98′ above ground level.

The project was organized in two stages. First, the arena's concrete structure was rehabilitated and upgraded to improve the structure's seismic response. Next came erecting the roof. However, the project team waited until the completion of the January-February bullfighting season before starting construction. It took a total of 10 months to complete the project, with five months devoted to designing, building, fabricating, erecting and installing mechanisms for the roof.

The roof required 709,000 lb of ASTM A500 HSS in sizes between 4″ and 12″. The structure was designed to support a total load of 25 psf and used a 3 mil alkyd primer with a 3 mil white alkyd enamel coating system. The wind load considered was 75 mph.

Playing Games

The structure was configured with a "tic-tac-toe" primary frame to support the moving roof and secondary beams. The main trusses consist of two 12″ round HSS top and bottom chords. The 17″-wide trusses used in this project exceeded nor-

It takes the roof's 16 motors about 3.5 minutes to open or close its panels.

Each super-truss spans 233' and was shipped in six sections.

mal shipping sizes, so special shipping equipment was required. Each super-truss had a span of 233' and was divided into six sections for shipping purposes. Temporary erection columns were required to assemble each of the 48,500 lb super-trusses.

The roof is a 2"-thick sandwich of aluminum at the inner face, a polyurethane panel, and pre-painted galvanized steel at the outer face. The total area covered is 50,590 sq. ft. While similarly sized arena roofs typically weigh 24 psf (including rigging grid framing), this roof design is only 12.8 psf. Because Colombia does not experience a snow season, designing for snow loads was unnecessary.

¡Muy Caliente!

The $3 million project received a nomination for the "Colombian Engineering Award," given by the Colombian Society of Engineers. During the arena's July 30, 2004 opening night concert, spectators were able to enjoy the roof's opening and closing process. Now, come rain or shine, La Macarena bullfighting ring is open for business.

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