Kansas City's See-Through Arena

Kansas City's Sprint Center arena. *2009 IDEAS² Awards: Bill Cobb, kcphoto.com*

Innovative 'IDEAS' in Structural Steel

Kansas City's spectacular Sprint Center is one of nearly 100 entries in the American Institute of Steel Construction's 2009 IDEAS² structural steel building awards program. For more than 70 years, the program has honored and celebrated excellence in "Innovative Design in Engineering and Architecture with Structural Steel" (IDEAS²). The notable steel-framed projects in this supplement are all entries in this year's awards program. The projects selected to be honored in this year's program will be announced at AISC's Steel Conference in Phoenix on April 1. For more information on the IDEAS² awards program, go to www.aisc.org/ideas2.

The use of architecturally exposed structural steel (AESS) and critical support steel on its doubly curved transparent curtain-wall system has enabled Kansas City's Sprint Center arena to fulfill its role as the center piece in the city's downtown renaissance.

The iconic curtain-wall cladding system, which allows clear views into and out of the building, is the most notable aesthetic design feature of the $276-million arena. To provide an elegant and non-distracting support structure, a system of curved vertical and horizontal steel pipe was selected from the numerous schemes investigated by the project team, which included a consortium of local architecture firms, HOK Sport + Venue + Event, Ellerbe Becket, 360 Architecture, and Rafael Architects, and Houston structural engineer of record Walter P Moore.

Curved horizontal 16-in. diameter hollow structural sections (HSS) spanning up to 50 ft are supported by curved vertical 16-in. dia. HSS spanning up to 48 ft. The horizontal HSS are moment-connected with end plates to reduce deflections. Moment connections enabled the engineer to economically minimize member sizes while meeting strength requirements and deflection limits. End plate connections with oversized holes accommodated the geometry and allowed for reasonable fabrication and erection tolerances. Because the HSS supports only the cladding system, fireproofing was not required.

Construction tolerances for the curved steel frame were tightened from those in the AISC Code of Standard Practice to facilitate connection of the cladding system. The steel support frame had to be erected to within one inch of the design location in any direction.

The arena curtain-wall's 16-in HSS steel is curved in the fabrication shop. *2009 IDEAS² Awards: Chicago Metal Rolled Products*

Structural steel also played a vital role in the 18,500-seat arena's roof structure, giving it extraordinary flexibility for stage configurations and show-rigging capabilities during sports, entertainment and other events. Long-span steel roof trusses taper to 32 ft deep and span 334 ft over the seating bowl. The truss configuration provides an efficient low-profile roof, with truss top chords forming the roof surface and truss bottom chords supporting the rigging grid and catwalks.

AISC member Schuff Steel Midwest, Ottawa, Kan., had responsibility for the entire structural steel package and engaged AISC member Hillsdale Fabricators, Hillsdale, Mo., for fabrication of the curved steel curtain-wall support frame. AISC member Chicago Metal Rolled Products, curved 750 tons of the 16-in. dia. pipe that gives the structure its unique shape. By using its full-service plants in both Chicago and Kansas City, Chicago Metal minimized construction time and cost.

From the initial design process to curving, fabricating, and erecting the roof and curtain-wall steel, collaboration was a hallmark of the project, enabling it to become a shining light for the city. ■