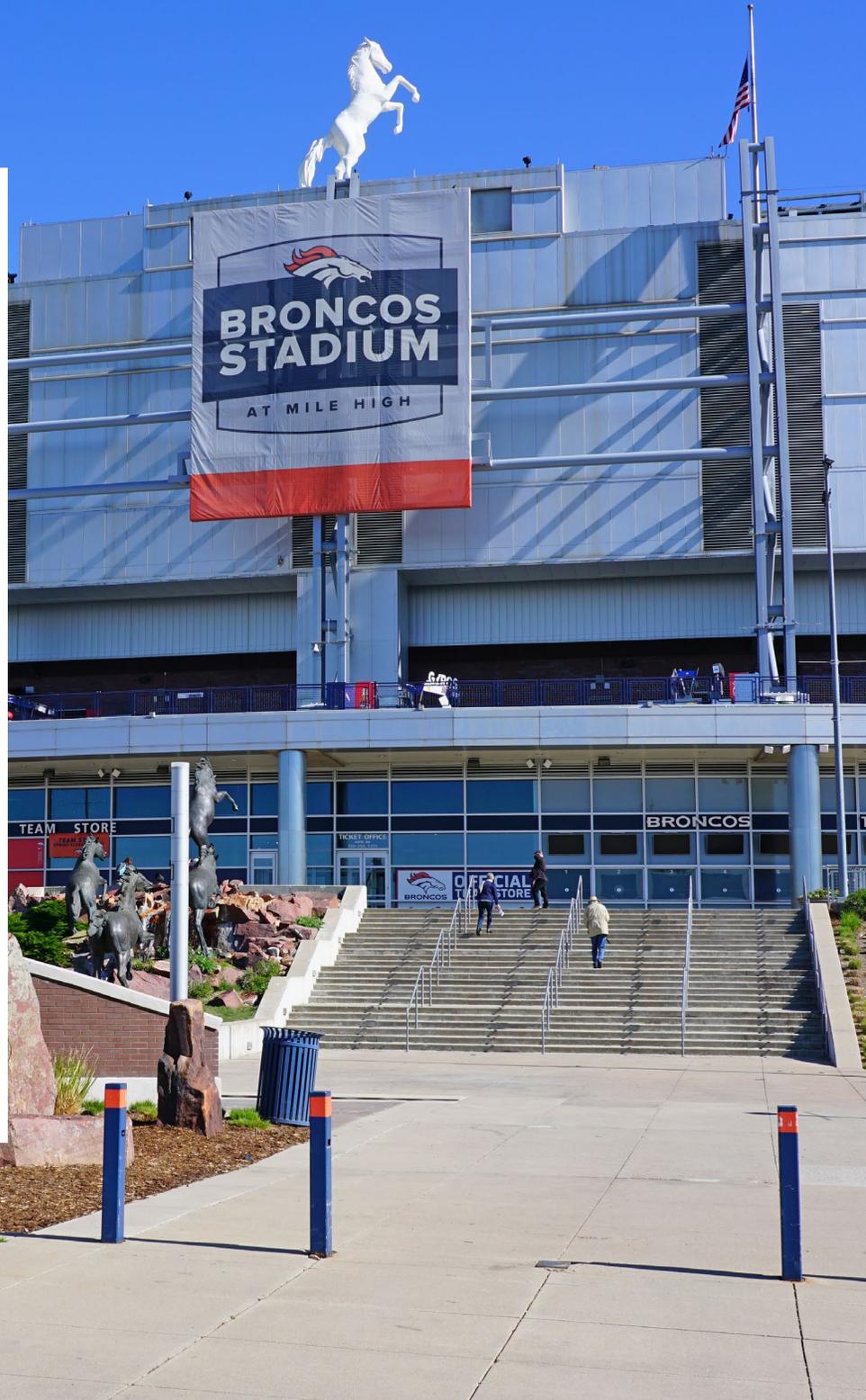


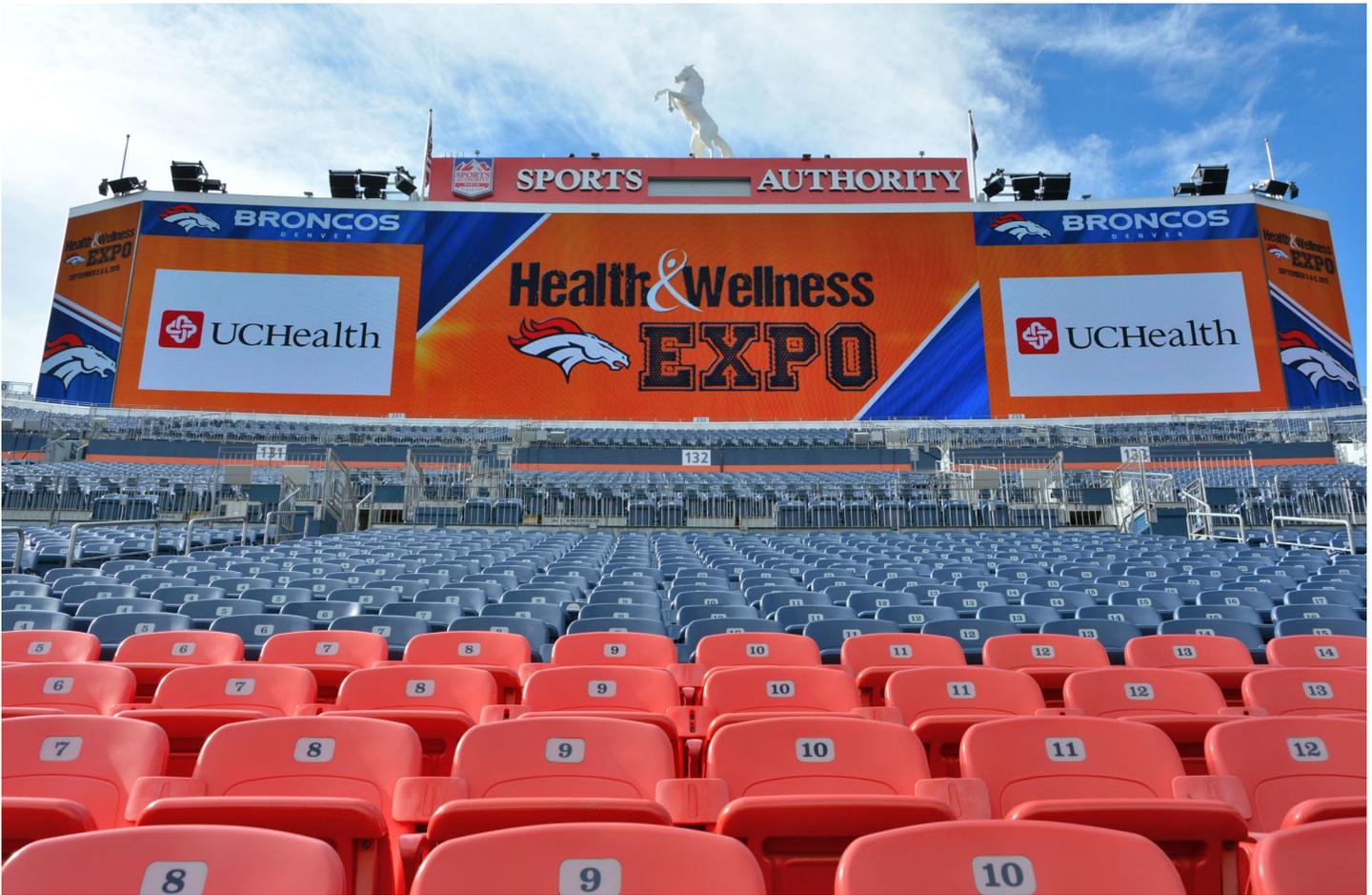
HSS

HOLLOW STRUCTURAL SECTIONS

**CASE STUDY:
OTHER STRUCTURES**

Invesco Field Scoreboard
Denver, Colorado





HSS LIGHTS UP THE SCOREBOARDS AT DENVER'S NEW STADIUM WITH BIG-LEAGUE COST/WEIGHT SAVINGS.

SCORE ANOTHER WIN FOR STEEL HOLLOW STRUCTURAL SECTIONS (HSS)!

Thanks to its strength and cost-effectiveness, HSS is the structural material of choice for Daktronics, a Brookings, S.D. firm which designs massive electronic scoreboards for major stadiums throughout North America and in countries around the world.

While Daktronics' forte is the electronic wizardry that makes today's scoreboards virtual entertainment centers, several years ago the firm began to take the responsibility for the structure of the scoreboards as well. That allows it to better bid turnkey jobs, a factor that frequently gives it a big competitive edge.

"We prefer HSS because of its high strength-to-weight ratios," says Todd Rose, Supervisor of Outdoor Project Engineering for Daktronics. "Its superior strength allows us to reduce the size—and thereby the weight—of the steel used in the box trusses that support our scoreboards. That weight savings translates directly to the bottom line and gives our HSS designs a big cost advantage over wideflange steel structurals."



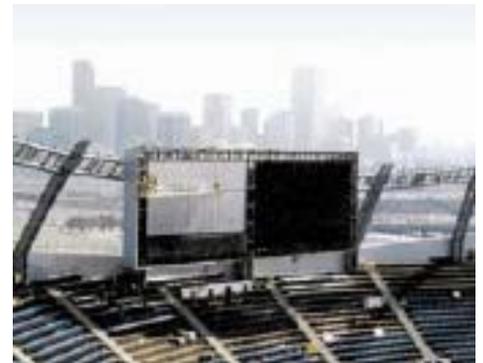
DAKTRONICS' HSS DESIGN SAVED 150 TONS

One of Daktronics' most recent projects that highlights the cost- and weight-savings advantages of HSS involved two scoreboards at Denver's new Invesco Field at Mile High. Displaying mirror images, the two structures are in the northeast and northwest corners of the stadium. Both are about 99' long and 33' high. They are cantilevered off the huge curved steel columns, or tusks, that support the stadium's seats and extend upward to hold the banks of lights.

When Daktronics bid on the two Invesco Field scoreboards, the specifications called for approximately 300 tons of wide-flange steel structurals. "We felt that design required far more structurals than needed to meet load requirements," Rose said. "So we bid on our own design, substituting HSS for the heavier structural wide-flange members in the original design. The higher strength-to weight ratios of HSS allowed us to design the same physical size scoreboard with 50% less weight, a total reduction of 150 tons."



"THEY'RE LIKE HUGE SAILS," ROSE SAID, NOTING THAT THE TWO INVESCO FIELD SCOREBOARDS WERE DESIGNED TO WITHSTAND WINDS AS HIGH AS 95 MPH.



EASE OF FABRICATION OF HSS SAVES EVEN MORE

Rose says that HSS also is less expensive to fabricate, paint and erect than wide-flanged structurals. "We do as much fabrication of trusses as we can in subcontractors' shops," Rose said. "Because of the straight sides of the HSS, it's easy to fabricate. It's all straight cuts and fillet welds, at 45-degree or 90-degree angles. We don't have to cope out flanges."

"We also saved time and money in applying a red primer coat to the trusses," he continued. "With HSS you have only four sides to coat, rather than six with wide flange structurals."



There were even more savings in the shipping and erection processes. The significant weight advantage of HSS allowed Daktronics to ship the scoreboard in six relatively lightweight sections. “Heavier loads can add to shipping costs, with the need for larger equipment and overweight permits,” Rose said. “We didn’t require either, thanks to the use of HSS.”

Because of its reduced weight, HSS also made the trusses less expensive to erect, since lighter capacity, lower-cost cranes could be used to lift them into place. Daktronics’ design concept further simplified the erection procedure by allowing all of the connections that were made in the field to be bolted.

NET RESULT: SIGNIFICANT SAVINGS IN COST

“When you add it all up, we achieved significant cost savings for our customer by using HSS, 150 fewer tons of steel, as well as savings in the fabrication, painting, shipping and erection stages.” Rose concluded. The support structure for the two Invesco Field scoreboards, like most designed by Daktronics, consist of upper and lower box trusses formed by various sizes of HSS and separated by vertical HSS columns.

The trusses are roughly 99’ long, 12’ high and 7’ deep. Each truss is shop fabricated in two sections, which are bolted together in the field. Principal vertical and horizontal elements of the trusses are 6” x 4” and 6” x 2” rectangular HSS and 6” and 4” square HSS. Horizontal and diagonal connectors are 3” and 2” square HSS.

A 9’ high connecting assembly, again shop-fabricated in two sections, separates the upper and lower trusses and brings the structure to its full 33’ height. This consists principally of 6” x 2” rectangular and 3” square HSS columns connected by 6” square HSS beams.

STRENGTH IMPORTANT TO RESIST HIGH WINDS

The strength of HSS is particularly important to structures such as stadium scoreboards because of the high wind loads to which they’re subjected. Daktronics has provided scoreboards for several other new NFL stadiums including those of the Cleveland Browns, Cincinnati Bengals, Tampa Bay Buccaneers and, currently, the New England Patriots. It also designs major electronic signage for the Olympics, casinos, shopping malls and other locations. And a growing market for their designs is electronic highway signage.

