The Inside Story

BY ALISON TROST

If you are planning a Disney World excursion, before or after attending NASCC, read this to better appreciate Spaceship Earth's extraordinary steel frame.

STANDING AT THE ENTRY to Disney's EPCOT in Central Florida is one of the world's most recognizable structures—Spaceship Earth. Designed and constructed in the late 1970s and early 1980s, it consists of a 400-ton structural steel frame supporting the world's first complete geodesic sphere.

A three-quarter geodesic sphere had been constructed as the U.S. pavilion for the 1967 World Expo in Montreal. But Disney designers wanted the entire sphere of Spaceship Earth to be completely above ground. To solve that structural challenge, they turned to Frank Heger, of Waltham-Mass.-based Simpson Gumpertz & Heger (SGH), who had done the work in Montreal.

Heger developed a plan to support both the sphere and the ride it would enclose on a utility platform built atop six legs. A ring of weldments projecting from the platform serve as hubs to which the sphere itself is attached.

With the primary design in place, Heger turned to Glenn Bell, then a young engineer with SGH, to serve as the firm's project manager. Bell and project architect John Grossmann described its development in an article for the 4th Quarter 1982 issue of *Modern Steel Construction*.

Their article describes the numerous other challenges involved in the project. For example, the structure needed to be aesthetically pleasing while also serving a practical function—housing a ride that presents views of future technology.

Where are they now?
After leaving Wallace, Floyd, Associates, John Grossmann (l.) established his own architectural firm, Grossmann Design Group, in San Francisco, where he continues to practice. Glenn Bell is now the CEO of Simpson, Gumpertz & Heger.


Spaceship Earth:
EPCOT Center's Gateway to Tomorrow

Making the structure waterproof was a high priority to protect the expensive ride equipment inside the sphere. In addition, Spaceship Earth required a drainage system that would control rainwater without inconveniencing park visitors.

The park's location also was a factor—the structure needed to be able to withstand hurricane-force winds. The solution was to use structural steel framing and a "double-skin" concept.

The best solution for waterproofing was deemed to be sheet neoprene, but that did not fulfill the designer's aesthetic requirement. Adding an outer layer of pyramid-like, triangular metallic panels with open slots between them allowed rainwater to collect underneath in a hidden gutter system.

Despite its apparent complexity, the structural steel frame consists of A572 Grade 50 steel struts in three sizes: W10×45, W10×33 and W10×22. The struts occur in three bands with the section weights decreasing as the elevation increases. To facilitate the steel fabrication, SGH engineers used the latest in digital technology—magnetic tape. Dimensional data from the structural design were transferred to the fabricator in Tampa and used to set up the fabrication machinery.

Spaceship Earth and EPCOT opened to the public on October 1, 1982, and the iconic sphere continues to be the symbol of Disney World in Florida.

To learn more about its design and construction, read the full article, which is available as a free download at **www.modernsteel.com/SpaceshipEarth**. MSC